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AIR FORCE ENGINEERING AND SERVICES

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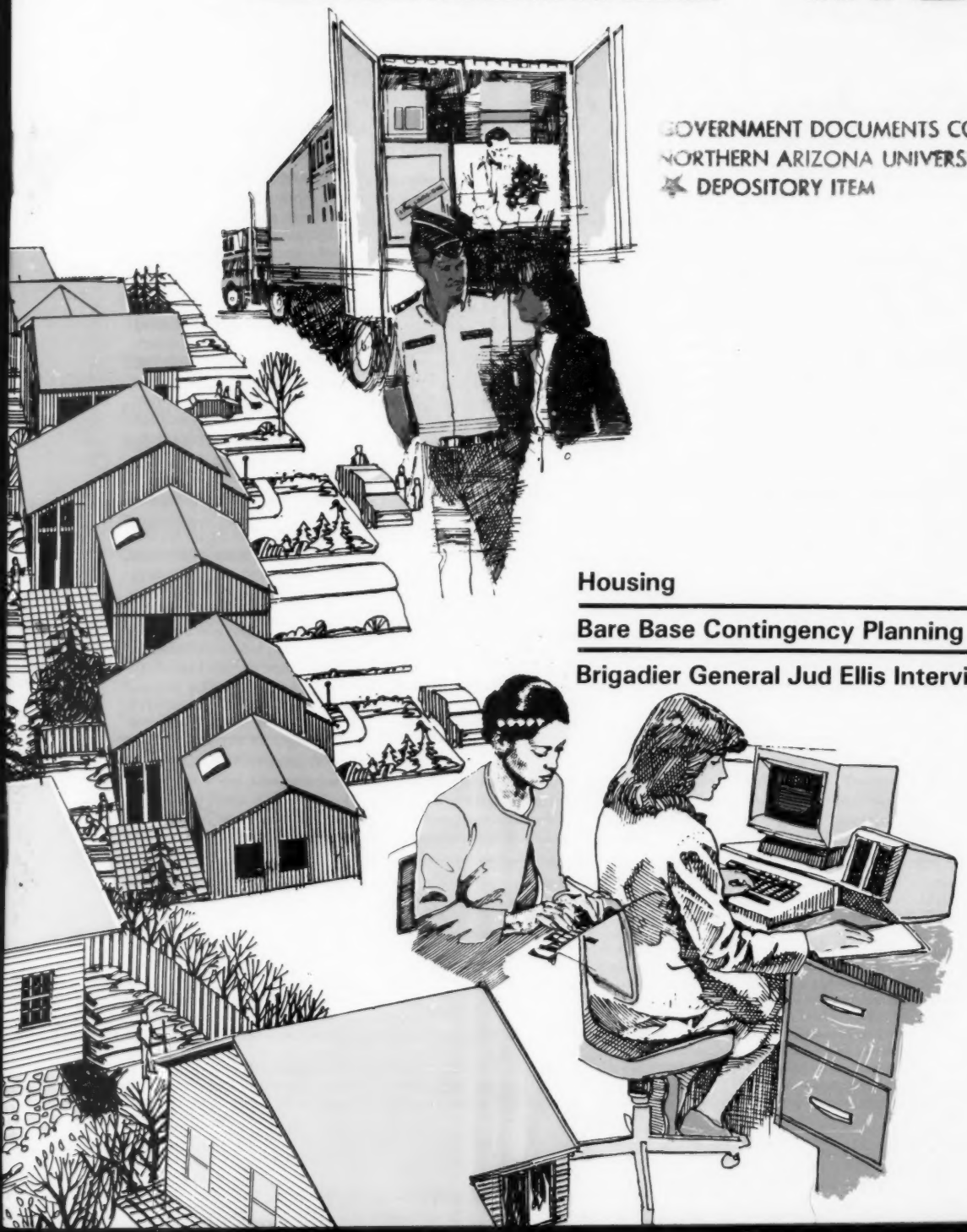


Housing

Bare Base Contingency Planning

Brigadier General Jud Ellis Interview

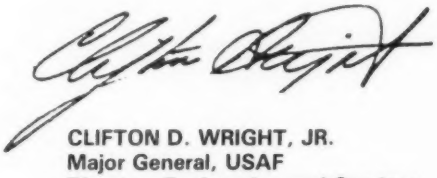
From the Director

The articles in this issue of the ***Quarterly*** represent a mixed bag of Engineering and Services interests, from a review of recent innovations in the TAC E&S community to an article on readiness reporting; from a look at bird strike hazard abatement to an item on electrical grounding systems. However, we place special emphasis in this issue on the subject of military family housing, and we have done so for good reason . . . family housing is a big and important part of our business.

Few, if any, other aspects of our Engineering and Services responsibilities reach across the spectrum of "concern" to the extent that family housing does. Commanders are concerned about housing; not just the units in which they personally live, but also about where their people live. They recognize the implications good or bad housing can have for unit morale and, as a result, productivity and readiness. Individual service members are concerned about housing; not just because they desire personal comfort but because they want safe, adequate, comfortable housing for their families. They, too, recognize the effect family morale can have on their ability to do their jobs. Others concerned about family housing (albeit for mixed reasons and degrees of self-interest) include politicians, realtors, utilities officials, merchants, contractors, etc.

It is important that those of us in Engineering and Services at all levels, from base to MAJCOM to the Air Staff, recognize our special responsibilities in the family housing arena. If we don't validate deficits and program new units, there will always be a shortage. If we don't adequately fund our base accounts, maintenance and repair of existing units will suffer. If we let the quality of maintenance and repair efforts deteriorate, our people will be living in less than satisfactory housing. And finally, if our housing referral offices do less than a professional job, we have failed in our obligation to provide an important service to the rest of the Air Force.

I encourage you to read this issue from cover to cover. All of the articles are relevant to E&S today, not just those concerning family housing but the others as well. Each contains information that should help us all do our jobs a little better.



CLIFTON D. WRIGHT, JR.
Major General, USAF
Director, Engineering and Services

Quarterly

AIR FORCE ENGINEERING AND SERVICES

AFRP 85-1 Vol. 24 No. 4

The USAF mission is carried out by people. Housing our people is critical to mission success.

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FEATURES

4 • From the frontier to the future:
HOUSING OUR PEOPLE
6 • **HOUSING WITH A HEART**
8 • **WINNING THE HENNESSY**
10 • An interview with Brig. Gen. George E. (Jud) Ellis:
THE INNOVATOR
16 • Profile:
ALLAN HOCKETT
20 • Birds and planes:
BASH
23 • **BIRTH OF A BARE BASE PLANNING GUIDE**
24 • A new frontier:
BARE BASE
26 • **COURTESY**
28 • An explosive situation in Korea:
UNDERGROUND POL
31 • Return to North Field, S.C.:
RRR TESTING
32 • Q&As:
ALL ABOUT AIR FORCE GROUNDING SYSTEMS
34 • It's not a four-letter word:
UNITREP
36 • **ANDREW's PLACE**

DEPARTMENTS

9 • **CURRENT EMPHASIS**
19 • **ESQ WORLD**
30 • **CESMETtips**
38 • **TECNOTES**
39 • **SENIOR OFFICER ASSIGNMENTS**

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- Promote professionalism, and devotion to duty.
- Stimulate planning for the wartime survival of our personnel, weapons systems and facilities.
- Develop Air Force stewardship of the well-being, quality of life and facilities support to Air Force personnel and their families throughout the world
- Promote awareness of the efficient, effective and essential facilities needs of the Air Force.
- Transfer knowledge of Air Force Engineering and Services' technical and scientific achievements.
- Promulgate teamwork among the Air Force Engineering and Services' total force.
- Achieve a professional dialogue to enhance the thought, development and contributions of the Engineering and Services team worldwide.

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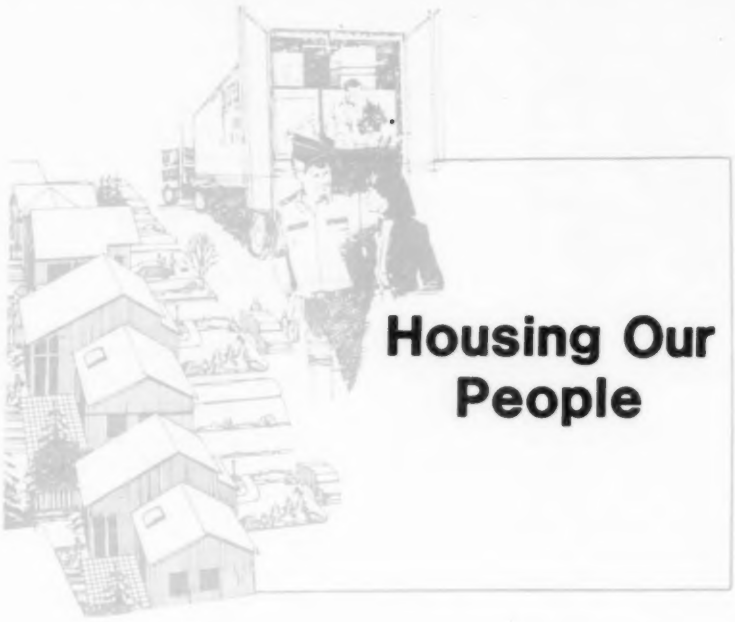


Housing Our People

by J.R. Millican

- What is it?
- Where did it come from?
- What is its future?
- Why do we have it?
- Why don't we have more?
- Why isn't it better maintained?
- Why aren't they larger and more modern?

How Did We Get Where We Are?

How did we get into the military family housing (MFH) business in the first place? Let's see. George Washington, Andrew Jackson and Robert E. Lee didn't have to worry about MFH. They lived at home for the most part and lived in a tent or temporary barracks when in training or at war — their troops likewise. Up until sometime in the late 1860s, there was no MFH because dependents and family members lived at home. Who needed it? If the Army wanted you to have a wife, it would have issued one!

When then, did MFH have its start? We have no written history for MFH, but from available data it isn't difficult to piece together its early days.

The first big change in the status quo came with settling the Western Frontier. As "forts" gave way to cities and towns, secured by the growing boundaries of a yet young nation, the functional need for protective garrisons became evident. We had settlers, with families and all their worldly possessions, attempting to occupy new lands. In time, the Congress saw fit to approve significant increases in the number of garrisons and authorized building a series of forts to protect the settlers. With the forts came our first military housing policy.

Forts were built (usually for a two-platoon cavalry unit) with quarters within the confines of the perimeter walls. Young officers started bringing their wives to the forts. This approach of having wives on the post worked successfully at first. Lieutenants got two rooms; captains, three rooms; a major, four rooms; and so on. There was no distinction between family housing and bachelor housing.

Frontier hostilities increased to the point that a third platoon was added at each fort. Increases in military strength and the number of accompanying wives created a new situation. Lt. John Jones and wife Mary of the 1st platoon lived on-post in their two rooms. Their unmarried neighbor, Lt. Roberts of the 2nd platoon, lived in two similar rooms on-post. However, Lt. Samuel Smith and wife Sally of the 3rd platoon had no quarters on-post (the first waiting list, we presume). So, the Smiths had to rent a miner's shack or live in a tent. But wait a minute. Jones and Smith both got $58 a month in pay (no housing allowance). Ah, this may be a first in a long series of military pay inequities.

BAQ Act of 1872

Military members of the late 1800s were not bashful about writing their Congressmen. Interest in the pay inequity spread in Washington and the first "Basic Allowance for Quarters (BAQ) Act was passed in 1872. That initial act had no resemblance to modern legislation for entitlements based on many complicated formulas and equations. It was a very simple $5 a month per room.

Remember, the lieutenant gets two rooms, or $10 a month in BAQ. A three-room captain could collect $15 per month and so on. What's really important about the 1872 BAQ Act is that it established a precedent, still valid today, which says that the military department will provide its members a house or money "in-kind" (BAQ). Now, we have a Congressional mandate to provide government housing to members with families or housing "in-kind" BAQ.

Now (1870-80) more young officers than ever were getting married and taking their wives to the frontier. Apparently, this created an unparalleled demand for family housing. Congress realized that building houses for all these young upstarts might be impractical and developed a public policy, which is still in effect today. The policy states, "The prime source of housing for military families is the adjacent private community." The Air Force follows this policy, as evidenced by the fact that 60 percent of our families live in private housing.

New missions or a rapid decline in availability of private units creates an urgent demand which cannot quickly be satisfied within the Program Objective Memorandum (POM) and Congressional budget time-constraints. It is extremely difficult to adjust the POM once it is set, or to get Congress to permit insertion of a late-starter project once the President's budget is sent to Congress. Based on 1982 surveys around the world, there is a 22,000-unit deficit of adequate housing, principally in Europe.

Incidentally, the 1872 BAQ Act applied only to commissioned officers. It was not until 1,000,000 "doughboys" went to France in 1918 to fight the first war to end all wars that Congress extended the BAQ entitlement to enlisted members (one million — a sizable voting block). Following the conclusion of WWI and the peace movement of the League of Nations, interest in the military waned, and enlisted members' BAQ was cancelled in 1922, not to be restored until the mid-1930s.

Back to housing. Between 1870-1938 there were some military houses other than the austere collection of rooms inside the frontier stockade. These houses, built at Army posts and Navy bases, were for officers and a few senior NCOs — and they were few in number. After all, how many houses did we need for the U.S. Army in 1939 when its members numbered less than those of the New York City police force?

Nonetheless, with the threat of war in Europe in the late 1930s, the military embarked on a sizable housing construction program coinciding with the 1939 mobilization effort and the National Draft

Act. During the period from 1939 to 1942 the Lanham Housing Act was introduced. Houses were put up for construction workers who were building WWII military bases. These structures were small, ill-planned, rapidly-built houses that barely met the minimums of a depression-guided economy. But, they were responsive to the urgency of the moment. The only difficulty was that the Armed Forces inherited the grossly inadequate units. We still have some today.

From 1942 to 1945, the country was engaged in global battle in Europe and the Pacific. Few military family houses were built. It was a terrible time for all, with many wives or families trying to follow their husbands to new or greatly enlarged military bases throughout the country. In these circumstances, wives were lucky if hubby could find a room in the home of someone who would allow kitchen privileges and a shared bathroom. Using Federal Housing Authority loan guarantees, there were some inadequate houses built near bases, but not nearly enough to cope with the community population influxes. Many dependents never had the chance to join their husbands at all. When the country was fighting to preserve the free world and its own existence, building family housing — however much needed — was not even on the wish list for most communities.

A New Era

Following WWII, this country entered a new era. Two things happened to forever change the way we fight and even the way we think. First, there emerged long-range intercontinental ballistic missiles (ICBMs). Second came aerial refueling techniques. All American wars, save the Revolutionary and Civil War, had been fought on foreign soil. With the advent of new intercontinental weaponry and the growing threat of a hostile Russia and its allies dedicated to "burying the United States," we knew we must now be prepared to fight on our own soil. The awesome threat and weapons systems ushered in a new era of large peacetime military forces.

To respond to the new and frightening threat, Strategic Air Command and other military bases sprang up rapidly across the country. For example, the SAC base at Ellsworth, S.D., was built near the sleepy village of Rapid City, whose population in those days numbered about 20,000. Imagine dumping a 5,500-member staff and its 3,500 families in such a small community!

The Ellsworth scene was repeated many times from coast to coast and started the largest military housing construction effort ever. From 1950 to 1970, through MILCON, the Air Force was building between 2-3,000 houses a year and acquiring another 2-3,000 via Wherry and Capehart programs. The other services were also involved with similar build-ups in housing inventories.

One day, in the midst of this build-up, the Office of the Secretary of Defense woke up to the realization that DOD was the largest landlord in the free world. Housing management hadn't been a large challenge in previous years (there weren't that many houses). The cost of operations and maintenance was skyrocketing. Something needed to be done.

About that same time, Congress also became concerned about the large and growing inventory of houses — "where the money went." In those days (late 1950s), funds for MFH were a part of the services' O&M appropriation. Each year's O&M budget justified large sums of dollars to maintain MFH. Congress, being sympathetic to the needs of families, provided the money to properly maintain houses. But, repeatedly, the money was spent to buy ammunition, torpedoes and jet fuel. There were no statutory rules for MFH. Congress was inflamed. They directed that a Family Housing Appropriation be established to control both the maintenance and management of the business. Following two years of study groups and blue-ribbon panels, the design of the Family Housing Management Account (FHMA) was completed.

In June 1962 the Congress enacted the account into law for implementaion in FY63.

FHMA Established

Although Congress had sought a separate appropriation for MFH, it was a "tack-on" to the Military Construction Authorization and Appropriations Act to lessen the number of different appropriations acts the Congress and services must address. Nonetheless, the FHMA acts as a separate appropriation. This is a fact often overlooked. When it is overlooked, it leads to confusion and possible statutory violations. For example, the general provisions of the MILCON Act(s) ***do not*** apply to family housing construction or to the O&M of MFH.

There was another anomaly. The account was created for the management and control by DOD instead of by the individual services. At the inception of the account, and for 20 years thereafter, monies flowed from the Treasury to DOD, not the services as is the case with other appropriations. DOD then allocated funds to the services similar to the manner in which a MAJCOM allocates funds to its bases.

Concurrent with the creation of the FHMA came a host of Department of Defense Instructions (DODIs). These covered a broad front of the management sphere. DOD collected and implemented a series of relevant laws and replaced the "other duties as assigned" approach with a more precise management system. The new systems covered, in a more organized and exact manner, the numerous subjects previously left to chance or ignorance. The systems covered such areas as Centralized Family Housing Management at Base Level, Management of Substandard Housing, Uniform Justification for Housing Acquisition and Improvement, O&M, Government Owned Rental Quarters, Housing of Key Civilians, Uniform Housing Assignment Procedures (all services), and Construction Standards, to mention a few.

Maintenance at Last

Under the new system of financing and managing, the services prospered for a while. Improvement and repair projects of undreamed scope and magnitude emerged and were funded. For example, when I went to PACAF in 1969, I inherited 14,000 houses. Most of these were 25 years old and some were built in 1903. Some were Lanham Act units and some were Yen housing built in a hurry with inferior materials and unskilled techniques as part of the War Reparations. The living, dining and kitchen areas were an abomination of chopped-up, marginally usable floor space. Seven thousand units had exposed brown concrete floors, no tile, no linoleum, no floor covering of any sort. There were hundreds of concrete-box-style houses in Okinawa amidst Typhoon Alley with floor-to-ceiling windows, a style adapted from southern California. The list of deficiencies was overwhelming, but under the relatively new FHMA, we were able to systematically identify the needs, program funds to cover them and award contracts to complete the work.

Change of Focus

In the late 1970s something in DOD went awry. Interest and funding decreased, and the Air Force no longer had the DOD support or funds to continue the

modernization efforts. The Army was having similar problems. Confronted with aging facilities and mounting backlogs of improvements, repair and new construction, both the Army and Air Force introduced an issue into the 1981 Defense Review Board deliberations which suggested FHMA be delegated to the services. They stated that the services, in conjunction with their field commanders, were better able to allocate an appropriate share of each services' resources to care for family needs. Subsequently, Program Budget Decision (PBD) 319, Dec. 18, 1981, provided for the account to be turned over to the services for FY83. It was too late in the budget process to transfer the account for FY82.

A quick summary at this juncture may help put the past in perspective and give a better understanding of what lies ahead. From the 1870s until the late 1940s, there weren't many houses and not much of a management problem. From the early 1950s to 1962, the number of houses DOD-wide had increased to about 450,000. We might characterize this period, when housing management was an extra-duty assignment for some officers, as the "old management." The period of 1963 to 1983 began a more scientific approach in caring for both the houses and families who needed them. The approach can be called the "intermediate management," and the period beginning with FY83, the "new management." I believe the new quality-of-life-oriented management will produce the greatest gains for the member and family. The new management is smarter, better educated, and realizes that the mission doesn't fly unless service members not only do their jobs, but also do them well. Therefore, the top leaders have focused on positive motivation. The Family Housing Program provides a key entitlement and positive moves toward recruitment and retention in the time of the all-volunteer force.

Looking Ahead

With insufficient emphasis placed on family housing matters in the late 1970s, we inherited huge deficits of housing in those areas where community support didn't materialize. We inherited huge backlogs of maintenance and needed improvements. Our financial program through the 1980s addresses these backlogs. Significant gains have already been made:

- In 1983, the Air Force increased its FHMA budget by 25 percent over 1982.
- There was a drop in FY84 caused in part by transfer of 3,000 units to Army control under Hawaiian Consolidation and in part by some White House last-minute budget cuts. However, these cuts have been offset by the $73 million Jobs Bill.
- The FY85 $1.1 billion budget is the largest ever, even considering inflation, and provides $206 million for new construction and $78 million for leasing to help reduce the 22,000 units of needed housing (principally for support of new missions in Europe).
- The FY85 budget also provides $70 million toward eliminating the backlog of needed improvements by 1990 and more than $150 million to reduce the maintenance backlog to a manageable level (one-half year's recurring work) by 1990.

FY84 legislation proposed by both House and Senate authorization and appropriation committees for housing acquisition adds two test programs: Rental Assurance and CONUS build-lease-buy. These test programs are limited to 600 units each at no more than two Air Force bases for each program. The addition of these new programs to the existing ones (new construction and purchase of existing family housing) increases managements' options twofold.

Moving from the facility-oriented look at the future to customer services, the Pentagon housing division is working as rapidly as possible on several initiatives to:

- make assignments to houses earlier,
- make referral service for private housing more effective, and
- make clearing and cleaning of quarters less painful and more reasonable.

Military Family Housing has come a long way since the time Lieutenant and Mary Jones lived in their two rooms at the frontier fort. The progress has not always been steady, but the changes have been upward and improvements in the quality of house and service have accelerated. With the continuing support of Air Force leadership, we can look forward to even greater improvements in family housing and a better way of life for each Air Force family.

J.R. (Jim) Millican is chief, Programs and Management Branch, Housing Division, Directorate of Engineering and Services, HQ USAF, Washington, D.C. Before his current assignment, he was chief of the housing division at Headquarters U.S. Air Forces in Europe, Ramstein AFB, Germany; and earlier at Headquarters Pacific Air Forces, Hickam AFB, Hawaii. He earned his bachelor of science degree in Engineering at the University of Texas in El Paso and is a registered professional engineeer in Texas. He is the Air Force vice president of the Professional Housing Managers Association.

by Wanda King

Permanent change of station (PCS) moves for both single and married military members can be just about the most traumatic situation affecting them in their careers. Besides having the difficulty of leaving best friends and beloved associates, having to change geographic locations every 2-4 years leaves a deep impression on how we look at moving in general. Expectant adventure is often lost when there are other concerns like: "What to do with the dog?" . . . "Where can we stay once we're there and will housing be available?" . . . "Two-month-old Timmy just can't take a 3,000-mile trip!" Let's face it, there are psychological, financial and logistical problems we'd rather not have to deal with!

During these moves most people often find their tempers short and fatigue common. At this time we need a friend, someone who cares and understands. We need a "special breed" of person.

Family housing folks are a "special breed" of people. They are ambassadors of Engineering and Services because they deal personally with almost all military members. In addition to job knowledge, they must be human relations experts. Too often, the member who seeks housing aid is already frustrated, angry and expecting the worst. When face-to-face contacts occur, housing employees must do the job effectively and efficiently. Equally important, they should be in sympathy with customer problems. Most are.

Many family housing people will do anything within regulations to help those in trouble — often using personal time and resources. I know of folks who have even taken families into their homes and paid for food and incidentals until the member has worked out financial problems. There isn't room for all of the "heart warming"

stories, but let me give you a few from housing people who care.

At MacDill AFB, Fla., the assistant housing referral officer, Lena Whidden, listened patiently as the young airman and his wife again told her about problems they were having with their landlord. Despite calls from the housing office, the landlord continued to cause misery for the young couple. The airman could not afford to hire a mover or a rental truck to make his move into another home. Whidden quickly found another apartment which they could afford. That weekend she, her husband and their son helped the couple move using their private vehicles. If the airman hadn't revealed the problem, no one would have known and they would have suffered still more from the now ex-landlord.

At RAF Lakenheath, British housing assistant Mary Craven sympathetically listened to a senior master sergeant's story. He and his family had arrived that very day. His wife had gone from the plane to the hospital, critically ill. He had found temporary quarters for himself and the children and was trying to locate permanent housing between visits to the hospital. Craven not only helped him find housing but added a personal touch to his situation. That day, during noon, she went to her garden and returned with a bouquet for the sergeant to take to his wife.

Moving to a new location isn't the only difficult phase. Moving out of base quarters can present the same angry, frustrated and worried approach. Take, for instance, a young couple at Andrews AFB, Md.

The young couple had failed their final cleaning inspection. Not counting on the failure, they had made all their plans to depart the area right afterwards. It was a Friday. They were to leave Saturday. Although they understood they couldn't leave until the house passed the inspection, they very much wanted to do so. It was the end of the duty day. The inspector told the housing manager of the couple's problem. The manager agreed to drive back to the base in his car late Friday night and personally inspected the house. He helped not only the departing family, but the incoming family who wanted to occupy the house immediately.

At Keesler AFB, Miss., a staff sergeant wrote to the base Inspector General on Aug. 1, 1983. He said,

> ***When I signed-in at the housing office, I was greeted in a friendly way . . . the staff exhibited a positive attitude. That first visit wasn't a fluke. The positive, friendly attitude prevailed each time I was in the housing shop. They acted in a professional way. It's the best office I have dealt with in seven PCS moves.***

Not all problems occur while moving into or out of base housing. Many times a staff is struck with out-of-the-ordinary cases. These occurrences can be anything from accepting a newly dependent relative to changing the entitlement of a sponsor to a situation like the following involving a young abandoned wife and her child.

The young woman entered the housing office at Wright-Patterson AFB, Ohio, emotionally upset. She spoke directly to the manager. Her military spouse was gone — AWOL. She and the baby were in base housing. He had cleared out their bank account. There was no money. She wanted help in returning to her parents' home in another state. One of the housing employees overheard and quietly collected money from all the staff. After she and the baby were fed, the manager personally took her to the Child Care Center, the legal office and Family Services. The mother and baby were sent safely to her parents.

These are but a few of the ***thousands*** of examples of housing employees going "that extra mile." Situations similar to these are happening right now — today. These types of actions will continue to be repeated by housing employees across the world each day — and year — simply because they care.

Wanda King is a family housing manager with the Directorate of Engineering and Services, HQ USAF, Washington, D.C. Other assignments include a five-year tour at RAF Lakenheath/Mildenhall, United Kingdom; and 15 years at MacDill AFB, Fla. She is past president of the National Capitol Region, Professional Housing Managers Association.

A Think Tank

by Wanda King

Efforts to improve the quality-of-life through better housing and housing services continues. We have made gains recently with benefits like: The Equal Housing Opportunity Program, Variable Housing Allowance/Rent Plus, Rental and Sales Services, and Mediation of Landlord/Tenant Complaints. Now, new actions are under consideration which may provide even more help. These actions include:

- A New Option — Going on the waiting list with your known future entitlement caused by promotion, pregnancy or increasing age of child or children, or staying on the waiting list with present entitlement.
- Early Occupancy — Allowing an adult family member (dependent) a power of attorney to go on waiting lists and accept housing when the sponsor is delayed en route PCS.
- Clean-Up Options — Providing an approved contract cleaning service as a cleaning option. The member pays, and the contractor stands the inspection. The member shuts the door and leaves, and BAQ starts that day. Or, a contractor is paid for an a la carte package (i.e. the kitchen only, all windows only, etc.) The member cleans the rest, and stands inspection. BAQ starts when the inspection passes. And finally, an option exists to self-clean or use the "mom-pop" cleaning team and stand inspection. BAQ starts after passing inspection.
- Future Cleanups — After-maintenance cleaning will probably be done by contract, releasing higher-paid craftpersons to better employ their skills, and ensuring clean quarters at initial occupancy.
- Better Brochures — Supplying a simple, standardized Air Force housing brochure with a color-coded area guide — maybe a green page for yard care, red for fire information, white for general information and blue for base-unique items.
- Standardized Booklet — Providing an Air Force standardized housing policy information booklet. This would include the "why and when" answers to assignments, terminations, grade and family categories, and new entitlements.
- Better Feedback — Making provisions for formal customer feedback — after maintenance, initial assignment, pre-final inspection and terminal inspection; and processing by housing people. Customer feedback would help housing people do a better job.

Winning the Hennessy

Yokota's Approach

by 1st Lt. Kathryn Riley

The message from the Chief of Staff of the Air Force read, "I am delighted to announce the 1983 food service Hennessy Trophy award winners . . .," and right on top was Yokota AB, Japan! For the first time in the 27-year history of the Hennessy Trophy, we were winners in the multiple unit category. How did we do it and what are the rewards?

The cooperation of the entire base added the extra effort which made Yokota a winner. We developed an extensive campaign to get the word to everyone on Yokota about the Hennessy award — what it is and how prestigious it is to a Food Service operation. We also communicated the benefits that the base gains from improved food quality, outstanding customer service and refined dining atmosphere. This "media" campaign involved briefings at commander's calls, articles in the base newspaper, and appearances on the military television station.

Our campaign paid off. All base organizations, especially civil engineering, supply, and contracting, worked closely with Food Service to ensure timely completion of those thousands of tasks that have to be done in any base-wide effort of this magnitude. Our base commander, Col. Barry J. Howard, always a supporter of Yokota's Food Service, encouraged official military visitors, local leaders, and other visiting dignitaries and groups to tour the dining facilities. He also continually aided and praised the people who worked to improve the dining facilities. Maj. Ken Rutter, chief of Services, first recognized the potential for improvement. He moved the dining halls in the right direction. The patrons voiced their approval of the changed atmosphere and improved food quality.

This encouraged Food Service supervisors, technicians, attendants, and storeroom clerks to put in that extra effort to make our operation outstanding. The supervisors instituted special functions, such as the candlelight dinner, featuring wine, steak and live music. The carry-out window provides a wide selection of highly desirable items, including low calorie items.

Our Food Service technicians and attendants are a combination of Japanese nationals and military. This is a true team effort. Military and Japanese technicians work hand-in-hand to prepare quality meals, serve proper size portions, promote small quantity cookery, and insure that the food looks appetizing on the line. The Japanese Food Service attendants work diligently to keep the facilities within sanitation guidelines. A key area within Food Service is the subsistence storeroom. Without attention to detail and good management techniques, this area could financially make or break a Food Service operation. At Yokota we have excellent Japanese storeroom clerks, Kentaro Kaneko and Tsugio Kasono, who take great pride in their operation. Their meticulous attention to detail in storeroom procedures was flawless.

The staff office is the coordinating point for all the work put in by each dining hall. Kokuyu Sung, our accountant, has had many years of experience and on several occasions, identified new procedures resulting in time and money savings for Yokota as well as other Pacific air bases. Our supply man, SSgt. Samuel Loftin, maintains an excellent five-year equipment plan and a secure warehouse system to efficiently issue expendable supplies. Not to be out-shone is our secretary, Katsuko Fukui. She monitors suspenses, keeps regulations current, and cheerfully types error-free papers — usually with a short suspense.

Of course, the ultimate driving force of any Food Service operation is the Food Service superintendent. Without a cooperative, motivated, and knowledgeable superintendent, a Food Service officer could not hope to compete for the Hennessy award. Yokota's superintendent, MSgt. Rogers L. Collins, is an extremely knowledgeable manager who really cares about his operation and his people. He was involved in every aspect of the Food Service program. He cares about developing his people professionally and spent many extra hours coaching Food Service competitors in airmen recognition programs and writing special citations and nominations for awards. His efforts as team leader brought Yokota's food service operation together striving for a common goal — to be best in the Air Force.

We won the Hennessy because of all these things, of course, but perhaps the simplest reason is that when the Hennessy Team came to evaluate, we were ready. The hard work and planning meshed together to produce an impressive operation. Edwin O'Sullivan, a Hennessy evaluator and a Food Service executive with the Port Authority of New York and New Jersey, told us that he was most impressed with our "natural attitude" during the evaluation. We did not clutch when the evaluators looked in every nook and cranny of our Food Service operation; we simply let our operation stand on its own merit.

What are the rewards for a Hennessy winner? The most obvious reward is the Hennessy Trophy presentation luncheon held in Chicago. The trophy itself is very impressive — a 70-pound silver cup with all the names of past winners engraved on its base. The luncheon was an affair to remember, attended by the nation's top food service executives from the National Restaurant Association, Society for Foodservice Management, and International Food Service Executives Association, and Air Force dignitaries. The Secretary of the Air Force, Verne Orr, was the keynote speaker. The eight representatives from Yokota will never forget the excitement and graciousness of the proceedings. Perhaps our two Japanese cooks, Kunitoshi Ando and Minoru Kurihara, were most impressed. The awards presentation was their first trip to the United States, as well as the first time they received such recognition.

Two of our top performers were given allocations to attend the culinary arts course at Cornell University, Ithaca, New York, and The Culinary Institute of America at Hyde Park, New York.

Overall, the largest reward for winning the Hennessy is the sense of pride it brought to all of Yokota's Food Service people and the increased satisfaction of our very important customers. We always knew we had an excellent operation, but after being recognized as a Hennessy winner, the whole Air Force knows it too! It was worth all the hard work, and we're going to be tough to beat in 1984!

1st Lt. Kathryn A. Riley is the food service officer, Yokota AB, Japan. She received her bachelor of science degree in nutrition from Iowa State University and completed a dietetic internship at Harper Hospital, Detroit, Mich. Prior to entering the military, she held positions as a clinical dietician at St. Luke's hospital, Duluth, Minn., and was nutritionist for the Iowa Maternity and Infant Care Project. She was a member of the food service team that helped develop the Services Information Management System (SIMS).

Current Emphasis

LIQUID FUEL STORAGE TANK ENTRY

New checklists have been developed for use by liquid fuels maintenance (LFM) technicians when conducting storage tank entries. These new checklists cover both vapor free and nonvapor free entries, replacing procedures contained in AFM 85-16, Maintenance of Petroleum Systems. The checklists were issued by letter to the field on September 9. (HQ AFESC/DEMM, Mr. Mumme, AUTOVON 970-6357)

NEW BILLETING FORMS

All billeting offices should now be using AF Form 2505, Guest Registration; AF Form 2506, Reservation for Individuals; and AF Form 2507, Reservation for Groups. These forms were published to assist in standardizing billeting procedures throughout the Air Force and have been available through PDO since January 1983 (See Publishing Bulletin II, Jan. 28, 1983). (HQ AFESC/DEH, Maj. McSwain, AUTOVON 970-6177)

HVAC IMPROVEMENT

Initiatives now underway include:

- Base evaluation teams are formulating plans and tracking progress toward an improved maintenance posture. One of the team's most important action items is developing a formalized training plan for all Heating, Ventilation and Air Conditioning (HVAC) personnel via contract, Air Force training courses and OJT.
- The Civil Engineering Maintenance, Inspection, Repair and Training (CEMIRT) team is assisting these teams by providing "hands-on" training on our weakest area — controls.
- Sheppard TTC will begin revising our basic controls course soon and will be designing a new advanced HVAC controls course in Spring 1984. (HQ AFESC/DEMM, Mr. Wilson, AUTOVON 970-6361)

PROGRAMMING, DESIGN & CONSTRUCTION (PDC)

Development continues on the PDC system which replaces DEACONS. Planning meetings Nov. 14-18 provided hands-on training for the MAJCOM/AFRCE functional users at HQ USAF/LEE-M. System administrators from the MAJCOMs and AFRCEs met at AFDSDC/PRE, Gunter AFS, Ala., to learn systems operation and receive PDC software. Operational testing began in November, initiating training by the MAJCOMs and AFRCEs for the people using PDC, and integrating the PDC system software with their own information management system. January is the target for sending software changes and DEACONS data transfer tapes to the MAJCOMs and AFRCEs. Final implementation depends upon equipment delivery and availability of telephone modems. (HQ USAF/LEE-M, Lt. Col. Beshore, AUTOVON 227-2039)

INSTALLATION RESTORATION PROGRAM (IRP)

A Department of Defense and Environmental Protection Agency memorandum of understanding, dated Aug. 12, 1983, clarifies mutual responsibilities for conducting and funding response actions authorized by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for cleaning up past hazardous waste disposal sites. Copies have been provided to all MAJCOM/DE/SG/JA offices to guide future IRP efforts. Air Force policy and technical guidance with emphasis on off-base effects from on-base sites, past-held lands and third-party sites, are being developed. (HQ USAF/LEEVP, Mr. Segal, AUTOVON 297-6241, and HQ AFESC/DEVP, Mr. Anderson, AUTOVON 970-6189)

DESIGN OF HVAC CONTROLS

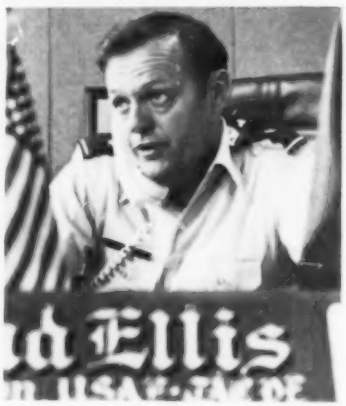
Design of Heating, Ventilation and Air Conditioning (HVAC) controls will be covered in a three-volume set of handbooks which will be developed through FY85 with contract assistance. Titles include:

- Fundamentals of Controls for New Design and Retrofit Applications, including control components such as variable air volume boxes and remote controlled elements
- Analog Electronic Control Systems
- Direct Digital Control Systems

(AF/LEEEU, Mr. Williams, AUTOVON 297-6237)

An interview with Brigadier General Jud Ellis...

the Innovator



EDITOR'S NOTE: Brig. Gen. George E. (Jud) Ellis, deputy chief of staff, Engineering and Services, Tactical Air Command, is known as an innovator. In this interview in his offices at Langley AFB, Va., it becomes apparent that necessity is the mother of invention. Among the innovations is the first E&S use of a minicomputer for a broad range of management applications. In his five years at TAC, he has also been an agent for change for Gen. W.L. Creech, TAC's commander. General Ellis discusses the relationship of the E&S effort to the ultimate goal of TAC and General Creech — sortie generation on the flight line.

by H. Perry Sullivan

ESQ: How did you get into civil engineering after graduating from West Point?

Gen. Ellis: I went to primary civilian contract flying school at Bartow, Fla., and then to Webb AFB, Texas, for basic flying training. I didn't fly the T-33 very well, so for my sake — and the Air Force's — they asked me to fly an engineering desk. After my departure from the flight line, my assignments took me to Randolph AFB; to Alaska where I satisfied my remote requirement; and then to Chanute Field where I constructed Minuteman training facilities concurrently with the upgrade of the Minuteman I to the Minuteman III. From Chanute, I went to Arizona State for two years and then to Vietnam for a year and a half where, mostly in an advisory role, I learned patience in an environment that was full of frustrations. Perhaps the most interesting thing I did in Vietnam was the construction of Premier Ky's private home on Tan Son Nhut Air Base. It was a big house — probably 18,000 square feet of house and administrative area. Building the house wasn't all that interesting, but the interaction with Premier Ky and Madame Ky during some of Vietnam's most turbulent political history provided an additional layer of excitement. I came back from 'Nam and went to the Pentagon as executive officer for the Director of Civil Engineering. The job I remember most that first Pentagon tour — other than carrying bags for generals — was being the boss of a group that we affectionately called the "mod squad." There are still some folks around who remember the old mod squad — some are still trying to forget. We studied the feasibility of industrialized construction techniques — volumetrics, large building units, factory produced modules, etc. We built some fine facilities for the Air Force using these techniques. From there I went to the Industrial College in 1972.

After my class whipped the National War College in seven out of eight sporting events, I went to Maxwell AFB, Ala., for two years as the base and command civil engineer. About the time I made colonel, General Thompson found me. He was forming the Air Force CESMET, and selected me as its first team chief. Then I served as the Operations and Maintenance Division chief at the Air Staff for about a year and a half where, among other base-level activities, I planned the move of part of the E&S Air Staff from Washington, D.C. to Tyndall. Toward the end of that difficult planning process, I was informed that I was going to be the commander of the Civil Engineering Center and the interim commander of the then unnamed Engineering and Services Center. I was the last commander of the Civil Engineering Center and first and last commander of an organization called the Engineering Technology Office. The ETO had about a six-week lifespan. I was also the first vice commander of the Engineering and Services Center. I came to TAC after Colonel Bill Rains retired. I have started my fifth year here so, although I'm not yet a relic, I am becoming an institution.

ESQ: So, you have been here for the period when TAC underwent its major upgrade in the appearance and functional utility of its facilities? Why was it done?

Gen. Ellis: We all need to understand that TAC improved its facility plant because making TAC look professional was important. It was a part of a much larger program which started with the reorganization of aircraft maintenance; a change in how we measured production output; and an understanding by the TAC Commander that facilities are an important part of the sortie generation equation. Five years ago TAC had too many "Ozark garages." We had skilled technicians working in maintenance areas configured for P-51s and other 40-year-old aircraft. TAC's aircraft maintenance facilities really showed 40 years of hard use. We also knew that the workplace had a profound influence on how the aircraft maintenance folks did their job. We now had F-15s, F-16s and other new weapons systems sitting on our ramps. They were figuratively "Indianapolis racers" — not Model A's — and we needed a "garage" system that was complementary to that professional style of operation. So, we fixed the garages. We fixed the inside first. We made a relatively expensive bet that if we gave the maintenance folks an appropriate place to work and quality tools to work with, we would have gone a long way in establishing the right aircraft maintenance mental attitude. We are now

Born: Millinocket, Maine
High School: Parochial; graduated from Stearns High School, Millinocket, 1953.
College: University of Maine, one year; U.S. Military Academy, Class of 1958, bachelor of science, Engineering; Arizona State University, master of science, Operations Research, 1967; George Washington University, masters, Science and Administration, 1972.
PME: Squadron Officer School, 1961; Industrial College of the Armed Forces, 1972.
Other assignments: Florida, Texas, Alaska, Illinois, Vietnam, Alabama; CESMET chief and Operations and Maintenance chief, Engineering and Services, HQ USAF; last commander Air Force Civil Engineering Center and first vice commander Air Force Engineering and Services Center, Tyndall AFB, Fla.

sending the same message with other facility improvement packages to the security police, munitions maintenance, transportation, and engineering & services folks.

We have the facts and data to prove that it was a sound decision. We now fly more in TAC — well over 50 percent more today than we did when we started five years ago. We do it with the same number of people, with about the same amount of parts, and with about the same amount of talent. Add facility improvements to the reorganization, some contagious motivation, and achievable goals and we had the ingredients necessary to make things happen, make things better, and make things last. TAC looks better, but we had a good reason. We did not make TAC look better because we wanted it to be a good looking command, although that's an important consideration. Our motivation was much deeper, much more profound. We established visible evidence through extensive facility upgrade of our professional management attitude. The fact that we also look good is an additional benefit that came out of that motivation. What we did was change our working and living environment to the extent that there was a "pride in belonging." It works! Young airmen, who in the past would have thought nothing of kicking in a dormitory door in a moment of frustration, are now the first to challenge anyone threatening to put a handprint on a dormitory wall. Airmen and their families who formerly were convinced "no one cared about how our bases look," now recognize the improvements made as a clear manifestation that the Air Force leadership does care. The ultimate result is that our folks work and live better and there is a measurable improvement in the condition and useful life of our real property assets. Again, our facility improvement efforts have had a positive effect on attitude, quality of the workplace and productivity.

ESQ: This suggests a major change in TAC's management philosophy. Why did the change occur?

Gen. Ellis: We changed our management style for a couple of good reasons. The command structure at TAC some five years ago changed very much. General Creech's style is as demanding as that of previous TAC commanders but is much more professionally progressive. He put together a headquarters staff which has really worked well together. We coupled the change in leadership with a fourfold increase in available resources for Engineering and Services activities. But, we had to learn how to do business differently. For example, when I came to TAC in 1979, the command had only $8 million available for our contract programs. I went to the boss and said, "General, you can't run the engineering and services business in TAC on $8 million a year and at the same time do the things you want done." So, he modified a couple of deployments and eventually made about $25 million available. In 1980, we spent $33 million. In '81 it was $49 million, in '82 it was $99 million and in '83 we will spend about $70 million. Some say the command looks so good because we had more money to spend than other commands. I can argue that by any reasonable measure, we did not have any more money than the other commands. We elected to use our resources differently. While the O&M program was increasing from $8 million a year to near $100 million, my staff remained the same size. We went from managing less than 100 active projects to over 500. At the same time the MCP was moving from $60 million a year to more than $200 million. The NAF program was moving from $6 million a year to $15 million. Housing moved from $15 million to $33 million a year. We had to do something different. We did. We changed the way we did business. In fact all major commands had to manage differently. TAC decided that a computer-supported management information system was an appropriate way to go. Early on, folks thought our minicomputer was just a toy. I said, "It is not a toy at all — it's a useful management tool." I had a real information distribution problem brought on by larger and larger construction programs. The computer was my solution. It worked, and it still works. Sure, the command is different. Anyone who was in TAC four years ago would not recognize it today or — most importantly — how it is managed. When I first arrived I was a little disturbed with the reticence of my staff. I think I understood the condition because the style of leadership prior to General Creech was less flexible. I found my staff "hiding under their desks" and generally afraid to be innovative. I also found my staff commenting on other people's ideas. I said, "Folks, that is the hard way to do business. It is not any fun. The fun part of this business is letting other people comment on ***our*** ideas." I turned them loose and they did very well. Many of the ..ew ideas in our business are coming from the TAC staff, not from other major commands and not from me. All I provide is an environment that permits them to be innovative. Seriously, the good ideas ***are*** coming from my staff. Success is contagious because they now know that the Engineering and Services world expects them to develop new ideas. Innovation continues to be part of our ambience. The staff is not afraid to think of new and better ways to do business. They are, by the way, not afraid to make mistakes. When we are wrong, we back off, analyze the process, and start again. This was perhaps my most difficult early management challenge — make the staff understand that there is no penalty for trying something new. But, we're the best staff in the business. If you don't believe me, go ask those folks in the back room. We sometimes are not very subtle about the way we tell people how good we really are. Actually I think we are proud of being less than subtle.

ESQ: What was your primary motivation toward automated information management?

Gen. Ellis: My first motivation was not a focus on the information package that the staff needed to manage the expanding con-

tract programs. That came along later and eventually became very intense. My real motivation was to help the folks at base level. I was convinced — had been for years — that managing 3,000 job orders per base per month could not be done effectively with a stubby pencil. I knew that the BEAMS system could not do the job. I'd tried that approach more than once earlier. I have been one of the vocal detractors of BEAMS for many, many years. Even when I was responsible for BEAMS I didn't like it. I didn't like it primarily because it forced us to manage the past. The only thing BEAMS let us do was look back to see what it was we hadn't done. I coined the phrase, "too late management." We needed to manage forward. I felt we could do a much better job if we managed what we had to do, not what hadn't been done. We needed to solve the problem before it became one. In fact, it is so bad that many of our BCE organizations don't know they haven't kept a commitment until the customer calls and says, "Where the devil are you?" Usually the question contains other expletives. It's hardly a good way to run our railroad. I know our credibility depends almost entirely on our ability to make and keep commitments. We make commitments to ourselves — design schedules, planning schedules, RMP schedules, etc. We also make important commitments to our customers — they are our most important commitments. The internal commitments are important for proper organizational management; but, we are interfacing with 2,000 to 3,000 customers a month at each of our bases and don't know explicitly whether we are satisfying them. That was my most critical problem. My second problem was that I didn't know what was available in the industry. So, I made an inexpensive investment. I selected two captain volunteers out of my hide — good guys named Hamill and Wentland. I invested five or six weeks of their time, $3,000 worth of travel and schooling, and sent them out to "get smart." I told them to learn everything there was to know about the computer industry. We now had some real power predicated on new and current knowledge. We were in a position to say, "You are not right. I know, because I've seen and I've touched." My next problem was acquiring the computer equipment. It was much more difficult than I expected, but we finally received permission to acquire a computer. We selected WANG because it was the only one on the GSA lease schedule that met our requirements. It was not the computer we really wanted, but I was concerned that we were going to let ***excellent*** become the enemy of ***good.*** WANG was good enough to do what we needed done. So we bought it without "bells and whistles." It turned out to be the right decision. The utility package available on the WANG, we have since found, is easier to work with than other systems. We got lucky. History is often kind. Our requirements coincided with a major change in the computer industry — in the information processing industry. There is no longer a requirement for total dependency on specially trained software programmers to write our computer programs. Initially we went to the data automation community and said, "Here are about 100 reports that we think are important. We would like you to put them on the computer." They told us it would take over 20 man-years of effort. We did it in 85 days with our new system. As a matter of fact, we developed 300 programs — not 100 — in 85 days! We now have over 600 programs on our WANG. There was, early on, a lack of understanding on our part, as well as the data automation community, as to how powerful the newly-developed WANG utilities were.

"...our credibility depends almost entirely on our ability to make and keep commitments."

ESQ: How do your people perceive the computer?

Gen. Ellis: It's a tool — not an expensive toy. And, because my staff uses it as a tool, it becomes an extension of their work station. That is why it's important to have enough terminals. If it is not "their" tool they won't use it. We found that we needed about one terminal for every three to four people. That seems to be about the right balance. I didn't force the terminals on anybody. I said, "Use it if you want to." A most interesting thing happened. We put the computer on-line on a Wednesday. It's usually lonely in my office on a Saturday morning and I like it that way. The first Saturday after we turned the computer on, there were four people in my office wondering why the computer wasn't on. So, we now turn the computer on Saturday mornings because folks want to come in and use it. It has become an extension of how they do their job. A couple of other interesting things happened. For example, I probably looked at fire statistics once a quarter. The person who was responsible for the fire statistics made sure the data was current on the due date; and, once a quarter I received a correct report. He now knows that I, as well as the entire staff, can see the fire statistics at any time. The statistics are now correct and current ***all*** the time. They are proud of them. They are involved, and I am involved. They know it is important to me that they do it right all the time. The universal display of data across the entire staff became a positive form of motivation that we had not predicted. I make it a point to view all of the available reports. I let the folks know that I am interested. I send them messages through the computer as reinforcement. We also learned some new things about human nature. There was one person who refused to go to word processing training. I held to my word and told her it wasn't necessary to go. Well, Bill Hamill with his "silver tongue" talked her into coming to the computer room only to look. She stayed through the noon hour and we had to throw her out that night. What started out to be a terrible threat to the way she did business became an important tool that she accepted. The computer became a non-threat. I was also very careful not to change anybody's job or modify any part of the organization. I think these job-threatening changes are important "do nots." In the past, a computer was typically a threat because every time you installed a computer it ultimately resulted in significant changes in jobs, modifications to the organization and loss of positions.

ESQ: So, you are saying that the computer simply expanded the capacity of people to respond, it didn't substitute for human requirements?

Gen. Ellis: Right on! Because you buy a power saw instead of a hand saw, you don't get rid of the carpenter. You can draw other analogies. The guy with the power saw can just do it faster and better. But that doesn't change the requirements of the job.

ESQ: Did you have a hard time convincing the rest of the Engineering and Services that this was a good thing?

Gen. Ellis: Yes, and it was much to my early disappointment. I probably made 25 speeches. I got tired of making speeches. I even brought the computer to the Worldwide Engineering and Services Conference one year. I really tried to explain to our folks what I had almost accidentally discovered. I could not make them understand because

their understanding of computers was limited by what they had previously experienced. But they were not really listening. I was saying that our development was a successful revolutionary approach! I was really frustrated! I had found a "better mouse trap" and nobody was beating a path to my door. I was finally convinced that the utilities part of our computer package defied explanation. I had to bring them in, sit them down next to the terminal and show it to them. Then their eyes would open and they would say "Yes, you do have something." At last they were listening, not just hearing. I'm not being unkind. I suspect I would have done the same thing. There is a strange syndrome, particularly in our business, that says, "I'm a computer expert, there isn't anything you can teach me about computers. I already know everything." I don't know why the syndrome persists, but it is there. Someone thinks that if they've had two programming courses and one systems design course they know everything they need to know. I swear, it's easier to teach someone who doesn't know how to spell "computer" than it is to teach someone who knows too much about traditional computers.

ESQ: Does the computer help get important management information to the decision-maker?

Gen. Ellis: You bet! That was our objective. Everyone has access to the data base . . . everyone can see it. All of a sudden all of our information became more correct. More eyes on the same data results in higher quality data. If someone spots a mistake, they can go back to the person responsible for that data element and ask him to change it. If the data is not correct, at least everyone is using the same information. You have to make decisions based on the best information you have. It needs to be consistent. Believe me, there is a great deal of comfort associated with all of your staff "singing from the same sheet of music." In the past, three people used to come to me with three different data elements. That is a terrible way to have to manage. You don't have to go find the real crew chief anymore because everyone can find the responsible crew chief through the computer. If "Frank" is responsible for a piece of information, everyone doesn't have to go see Frank to get that information. Frank has already distributed it to them.

ESQ: How did you build your program?

Gen. Ellis: We did it from the "bottom" up. There is some danger in working from the bottom. You only get a management information package as good as the folks can make it. Sometimes they don't have the entire picture. It's not their fault. They are sometimes constrained by their part of our management world. The utility program associated with the WANG permitted us to develop our own programs. We did not need a dedicated programming shop to help us. I directed zero programs. I said, "You put in the data that you think you need to do your job and ***you*** manage that data." The utilities were so easy to use that we did it ourselves and did it very quickly. We learned another lesson. In the past when we went to the data folks to write a program, we would describe as best we could the management information we wanted. Months later they would come back with ***their*** version of ***our*** program. They would typically say, "Here's what you said you wanted." You looked at it and said, "But that's not really what I wanted." We accepted the program because we knew it would be months before it could be changed. That part of the information requirements problem hasn't changed. We discovered that our ability to articulate clearly and program precisely what we needed took us at least four iterations. Our folks developed the computer program they thought they wanted. Our existing data was pretty good because we seem to collect about everything collectable. Our data collection remained essentially the same. What we individualized were the reports generated from the data. Typically they would evaluate their first report and say, "Damn, there is a better way to display my information." The difference now is that instead of waiting months for a change, you can change it yourself in about three minutes. They went through three or four iterations and finally developed the management information they really needed to do the job. We can't keep going to software houses. It's expensive and counterproductive.

Nobody collects information for me, I "borrow" from them. Every bit of information collected is collected by the persons responsible for the information and they collect it for themselves — not to make my job easier, but to make their job easier. It does make my job easier, but the information flow to me is transparent to the person who maintains the data base.

ESQ: Was there much innovation and discovery associated with the conversion to the computer?

Gen. Ellis: Absolutely. We did some things with the computer that WANG didn't know could be done. We did it because nobody told us we couldn't do it. We just did it and then showed WANG what we did. I don't have to apologize for the innovativeness, talent, potential and capability of my staff. There is absolutely no disruptive competition between my directors (although my Services guy has to go down and beat up on my DEM guys every once in a while). We have created an environment where the DEE folks don't have to worry what the DEP folks are doing. They work the issues together. After we turned on the computer one and a half years ago, I had folks from my programming shop meet folks from my contract management shop where they experienced for the first time the construction side of the business. When you are managing literally hundreds of projects, that communication is important. The construction folks put contract funding information in their data files that is relevant to the funds shop, who now never have to worry about getting the correct contract funding information. They now get it "free." The ultimate result was that the professional in-

teraction of the staff was increased by a factor of two or three. Because of this interaction, we do our job much better.

ESQ: Must you protect the integrity of the data?
Gen. Ellis: Yes, it's very important. We have total protection of the data base. We never let a person change a piece of data that doesn't belong to him or her. You can have the best of both worlds. Everyone can protect totally what they input or — at the other end of the spectrum — permit anybody to make changes. It's ***their*** choice. It's ***their*** data. One of the difficult challenges we had to solve was making people understand that the data could be shared for free. For example, they would unnecessarily input all the base names themselves before they realized that the administrative folks had a file of the bases that they could access, and, the names were correctly spelled already. Now you can't change the name of the bases on the list — you don't want to — but, you can gather for "free" all the correct information you want about those bases. Administration has all the base names with zip codes because they need and use a mailing list as part of their job. This is efficient and effective information sharing. As a result of this sharing I think we have become closer organizationally. It helps us work better as a team.

ESQ: Do the Services folks play strongly in the computer programs? Do you feel that Services must have the same priority in the program?
Gen. Ellis: I sense that we too often separate Services from the Engineering part of our business. The Services information requirements are as important as the Engineering requirements. Here at the staff level, I see no difference. At base level, I sometimes see a difference, but it's hardly a measurable one. The Services guys on my staff got started fast, perhaps faster than the Engineers. They found some real utility in the system. There was a food service report that took two people and eight days to complete. It was never correct. The computer takes the same report and does it for them in less than 20 minutes; and, when they get done with it, it's right. Yes, the Services folks play strongly. I think, because the Engineering community is the predominant group, we sometimes forget that requirements for the Services folks are the same. The risk level associated with managing Services is a hell of a lot higher than with managing Engineering. Services folks operate a risky business. If you don't think so, mess up a dorm assignment; mess up a meal in the dining hall; carry out a mortuary case improperly. Services must be managed well and carefully. We need to give them all the tools available. When I go to base level and put in an Engineering system, I also put in a Services system. Two reasons: one, they need it; two, I'm recognizing their importance . . . it's a critical "message."

ESQ: There is little doubt that Services is important, just judging from the tasking in

support of operational and exercise deployments. How do you deal with the constant demands on TAC for the deployment of your Services teams?
Gen. Ellis: We are a "suitcase" Air Force in TAC. We respond to many contingencies. I have an additive manpower package of about 80 people, but on the average I keep over 100 deployed every day. I have people sitting in Ramstein, Sudan, Egypt, and Central America; even now as we talk, I have people cooking all over the world. We handle it in two ways. First, we have the additive manpower package. Second, I distribute the hurt throughout the command. I do not want to be unfair to any organization. What makes it work is that it's an accepted way of doing business in TAC. The flight line guys and the Engineers are going, so it becomes almost routine. The young officers and airmen going out and performing those Services and Engineering functions in the field do it very well because they get excellent training. We are organized to go to war and are prepared to do it well. The deployment we made into Sudan with the AWACS and F-15s was a real contingency that we did very well. I needed a senior officer to lead the group. It was an important task and kind of sensitive. I didn't have to seek out anyone, I had more volunteers than I could use. Sure — deployments are an encumbrance on how we do out peacetime business — it makes running the bases tougher. But that's our business. We do it so often, it becomes a routine way of life. If it really gets bad I ask for augmentees from the Reserve and Guard. When we use up all the resources, as we have on occasion, I go to other commands and borrow some assets. I don't like to do that, but I do. We balance it well and nobody goes more than a couple of times a year unless they are volunteers. The bottom line is that we are ready to deploy, employ, fight, and win.

ESQ: How do your civilians fit into the way TAC does its business?
Gen. Ellis: It's a challenge for me and for our civilians. We have competing objectives: the operation and maintenance of our bases doesn't get much attention from the "blue suiters" when they are training to go to war. We are already short of manpower . . . some 900 slots to do our peacetime job. We are far short of what we need to go to war. You take our shortages, add in the contingencies, exercises, TDYs and leaves, and then take another 15 percent off the top for wartime training, and we offer our dedicated civilian folks a real-life challenge. Obviously, we must place an additional workload on our civilians in TAC. Because we train more doesn't mean that our workload is reduced. The workload in the command is probably larger than it ever was. We have few problems, however. Our civilians do what has to be done. I'm proud of their work and their positive attitude. I remember very well back when our contract programs were expanding so rapidly. Most of our civilian professionals in TAC signed on originally to do design. That was their preoccupation, their vocation. With the increase in O&M and MCP funding it wasn't possible for them to do much design. We had to transfer the design load to private architect and engineering firms. Their jobs went from being professional designers to being technical reviewers. It's a totally different way of doing business. Believe me, it's much more fun to design than it is to tech review. You have to be

careful during the tech review stage. It's hard to tech review and not redesign. I told our folks up front that for three or four years statements of work for private architects and tech review would be their primary job. I have not heard one significant complaint. I think everybody — and I mean everybody — ends up gladly doing what has to be done to get the job done.

ESQ: What do you think needs to be done for our business?

Gen. Ellis: Some folks in our business consider me overly critical. I am ***very*** critical about some of the things we do, but I think my motivation is on target. We ***can*** do better. We have some terrible problems to solve. For example, we have been playing with the productivity measurement for years. All we have been ***doing*** is giving it paper and lip service. The engineering performance standards are hollow. If you want me to increase productivity by five percent, I can do that. I can tell you I did it with impunity because there is no way to prove I didn't. We really need to change our approach to productivity enhancement. We need to stop the charade, remove the facade. We've been doing it with mirrors for too long. The emphasis needs to be on modern equipment and intensive training. Our current initiatives on engineering performance standards and productivity measurement techniques are necessary to some degree I think, but they need to give way so that we can attack the "gut" issues like tools, transportation, supplies, information, communication and people. Said another way, what we really need are modern tools, adequate transportation, relevant information, good radios, available supplies and quality training.

We have a continuing need for vehicles. It must cost us $10,000 just to get a vehicle authorized. They only cost us about $5,000. Yet we go through a "Kabuki" dance with the vehicle authorization board, a battle with the folks who take care of the TAs, and prepare a mountain of justification before we ever get one. I know we're doing it wrong. I know we don't have enough vehicles because when we hire a contractor to do family housing maintenance, he comes in with a different vehicle package. His motivation is not much different than ours, as far as wanting to do a good job, but he is different in how he allocates his resources. He comes in with a truck per person, plenty of supplies, and everyone has a radio. Now, we ought to be smart enough to learn something from our profit motivated contractors. On the average, our craftsmen cost us about 22 cents a minute. If you save only 30 minutes a day because one of our folks has his own vehicle to get to the job site, we can amortize the cost of the truck. We do the same thing with our radio communications. You would think that with the advent of satellites that a hand-held walkie-talkie you can buy down at Radio Shack for under $20 was a big deal. Again, it must cost ***us*** at least $10,000 to get a radio authorized. The actual cost of the radio must be less than $1,000. We do the same "Kabuki" dance because we have some organization in our business that is responsible for saying "no" to anyone who wants a radio. I don't mean to be overly critical; they are doing their jobs according to the criteria established in their regulations. However, if we saved our workers 10 minutes a day, we could pay for the radio in less than a year! A radio is nothing magic, it's just another tool. We must change our thinking process because of the large increase in the value of manpower. We must compare the value of our manpower to the cost of our equipment. Manpower costs are higher today. In fact, wages are our predominant cost. Yet, our management style hasn't changed. The equipment we need to support the predominant cost is still managed as though it were 1956.

I also think we do a terrible job with our training programs. We are doing better, but not good. We obviously need people who really know their job . . . both military and civilian. Knowing what to do and how to do it are significant contributions to productivity. This becomes even more important as our systems become more complex. Our focus needs to be on upgrade and continuation training. If we surveyed the real capability of our craftsmen to cope with our new systems, I think we would be alarmed at their lack of competence. System knowledge, system trouble shooting and system repair are all weak. Their approach too often seems to be unstructured trial and error . . . anything to make the damned thing work. "Brogan" maintenance and repair is still in vogue. Training is a serious issue.

I also think our shop tools are a key element of our productivity. When they come out with a new pipe threader, or an electronic surveyer, or a radial arm saw, we ought to take advantage of the productivity that is inherent in that new piece of equipment. We ought not to take so long to get modern equipment. That applies as well to the tools in our tool boxes. We need quality tools. You give a craftsman a cheap wrench to do a job and you send him a negative message. Give him a quality tool and you send the correct message. We too often forget the motivation of the person that turns the wrench.

We have a program in TAC called Silver Blade where we have committed about $2 million this year to fixing up our Engineering and Services shops. We'll continue about the same level of effort next year. We don't want to make the shops prettier, but we'll be more productive because the shop areas will be more functional. Our shop facilities across the Air Force are generally deplorable. We only get one or two modernization projects in the MCP each year. At our current rate it will take us 25-30 years to solve the problem. I'm worried about the future.

ESQ: How do you feel about the new awareness of military professionalism, the reacquaintance with the profession of arms, as evidenced in Project Warrior?

Gen. Ellis: I think it's important. We too often forget why we wear a blue suit. We need to be more military. If we could afford it we should do more worldwide field exercises, more realistic training for war, and Lord forgive me, more parades. If we want to be different, if we want to have the folks understand and respect our traditions, make folks understand that our world is different from the civilian world, that we are a profession not a vocation, that we are ready to go to war, then we must work hard to maintain a sense of our heritage. You can't perform like civilian industry and expect folks to think and act military. Project Warrior is a good start to reinforce our traditions. We need to look at history to see why we do the things we do. We just need a little more "duty, honor and country." It does two things for us. One, I think there is some goodness in being different, because we do something very different; we train, fight and too often die. We ***can't*** forget that. We need to be different based on that fact alone. Two, it lets a youngster coming in know whether he or she wants to be part of us. If we can show them that we are military people in peace as well as in war, they can then make a rational decision as to whether they'll stay or not. Our peacetime

Early on, folks thought our minicomputer was a toy, I said, "It is not a toy at all — it's a useful management tool."

versus wartime ambivalence is confusing. So, I blame *us* most of all for establishing an environment that is more vocational than professional. We did that to ourselves and if we want, we can fix it ourselves. Project Warrior is a good start. I remember the day when a staff sergeant was a god. I don't think we should ever go back to that; but, at least a chief master sergeant ought to be in St. Peter's league.

ESQ: Why do you feel we drifted toward military vocationalism? Was it because at one time we wanted to appeal to the career motivations of young people coming in?

Gen. Ellis: We have to understand that our country went through a terrible trauma during the mid-60s and early 70s. The military assumed that same trauma into its own ranks. There was one year when the number of qualified applicants for West Point almost equalled the number of spaces available. Now the Academy gets 65,000 qualified applicants each year. So, we went through some very trying times where we took what was available and too often acquired some not so good folks. It was a buyer's, not a seller's, market. We are now doing better. I'm impressed with our AFROTC scholarship program. The AFROTC staffs do a good preselection job for us. The people they select for these scholarships are already pretty good. They are better academically and they have exhibited some military aptitude. We give them a good scholarship and put them through two or more years of school. Officers coming out of the program are just plain good. I have several junior officers at each base who graduated from the program. There is a surprising percentage of "real keepers." The quality coming out of that preselection process and the investment we're making in their education is getting us quality people. There was a time when I wouldn't have swapped one OTS graduate for three AFROTCs. Now the quality of AFROTC graduates has improved so much that I stopped worrying about the problem.

ESQ: This has been an interesting interview. Do you have any additional comments?

Gen. Ellis: Yes, I have a couple of final thoughts. The Engineering and Services business is in good shape . . . better than it has been for many years. We have better processes, more dollars, and dedicated people with the right attitude. My motivation is to make an already good organization even better. We are also firmly established, inextricably bound, as an important part of the Air Force's fighting business. We will not go to war without blue suit Engineering and Services folks. We are part of the varsity, the first team. It's never much fun to sit on the bench.

There is an unusual sense of urgency in the air, an urgency fueled by the unrest in the Middle East and Central America, the Soviet destruction of a Korean airliner, and other disruptive adventuresome activity of the Soviet Union. No cause for serious alarm, we are ready. We only need to put an "edge" on our planning and training . . . a professional commitment to be prepared to deploy. The Air Force's ability to deploy is tied to the ability of our Prime RIBS and Prime BEEF teams to deploy.

"Our Air Force is the cornerstone of both our nation's will and our nation's strength."

Finally, the destiny of our nation is determined by the will of its people and the strength of its military. Our Air Force is the cornerstone of both our nation's will and our nation's strength. It's great to be part of it; but, we need to be an integral part of its growth . . . watching is a spectator sport. Participation is where the action is! I think the Air Force Engineering and Services family needs a special perspective to meet our future challenges. We need a perspective that is a healthy marriage of experience and vision . . . vision that transcends a single new issue, a single personal or professional interest, or a single principle. The result of this marriage should be a personal commitment from all of our folks that will sustain the kind of Engineering and Services organization we want to leave as our legacy to those who will follow us. That's a difficult way to say, "Make it happen, make it better, make it last."

by Sgt. Lea G. Blake
Associate Editor

Birthing A Career

Allan Hockett entered the Air Force as a second lieutenant in 1965. His assignments included the Ballistics Systems Division, Air Force Systems Command, as part of a Site Activation Task Force (SATF) with the Minuteman Missile System. "That organization," he said, "performed modifications to real property with the Minuteman wing at Ellsworth AFB (S.D.). I was there about 18 months and then went to an overseas remote assignment — Iceland — where I was the civil engineer for Air Forces Iceland (AFI)." He then went to Wright-Patterson AFB, Ohio, as a civil engineering officer/architect in the Design Branch of the Aeronautical Systems Division in support of its research laboratories.

After working in private practice from 1969 to 1976 with architectural firms in Ohio and Colorado, he joined the Aerospace Defense Command headquarters. As a civilian architect he designed facilities for ADCOM as well as programming and inspecting their NATO facilities in Iceland. In 1980 he transferred to Langley AFB to lead the TAC Design Team.

One-of-a-Kind Team

"The design team refers to a multidisciplinary group of architects and engineers dedicated to providing in-house design capability to the DCS for Engineering and Services at TAC. This is the Architecture/Engineering Branch of the TAC Design Office. The other half of the office is the Interiors Branch which provides a full-range of in-house interior design services for TAC. As a combined office, we are capable of designing projects for all facility types throughout the command," said Hockett.

"I think the idea of a design function at a major command was the outgrowth of the command's emphasis on design — on improving the quality of life for people through the design of efficient and aesthetic facilities. As such, we're an additional resource, an in-house team managed much the way a commercial A&E firm is, but with faster response times and a greater knowledge of current Air Force facility requirements."

Hockett enjoys being an architect in what is primarily an engineering organization. He said the opportunities are, "Excellent. The educational backgrounds of architects and facility engineers differ in that architects tend to concentrate on combining art and technology in the design process. However, I see all of our disciplines, including interior design, moving in the same direction — to improve the quality of our built environment. No one area of expertise can do it all and we can comple-

Profile

Allan Hockett

The Human Factor

NAME: ***Allan Hockett***
POSITION: ***Chief of the Design Team, Tactical Air Command, Langley, AFB, Va.***
EDUCATION: ***Bachelor of Architecture degree from Auburn University and graduate studies in Psychology at the University of Colorado.***
REGISTRATION: ***A registered architect in Colorado.***

ment each other, which is what we do in this office."

No Ideal Situations

When asked how many of his ideas have been implemented to his satisfaction, Hockett replied, "Quite a few. But any facility designer needs to recognize there are no ideal design circumstances or situations. Every building problem has characteristics which limit what we do architecturally. Some of those may be budget, time or site restrictions; some may be political or organizational. I think the most severe restriction can be attitude. For many years architects have been making strong statements about the need for a quality environment and how it affects each of us in our daily lives. Prior to the last 20 or 30 years, most people thought a person's ability to cope in the environment was based on genetic structure, heredity and things of this sort. It's only in recent years that the social psychological community has begun to recognize the value of positive constructed environments. With the advent of the social psychologist coming forward and saying, 'A man's environment affects his life — the quality of his life,' there has been a change. I feel we're now moving from a quantitative to a qualitative yardstick for measuring our success."

Intern-Architects

As a registered architect, Hockett is very involved with the Air Force Intern-Architect Development Program (IDP) and how this program can best help qualify Air Force Intern-Architects to take the examination required for registration.

"The Air Force IDP is based on an agreement with the National Council of Architectural Registration Boards (NCARB). Prior to this agreement, most state registration boards gave minimal recognition to intern experience in the Air Force even when acquired under registered architects. With this agreement, the Air Force intern participates in the National Intern-Architect Development Program.

"The program provides a well-structured recordkeeping system to verify the type and amount of experience being accumulated by the intern. This program is excellent for transient interns such as Air Force officers because it's generally accepted by all states."

Hockett described necessary qualifications by saying, "Intern-Architects must acquire at least three years of very specific kinds of professional experience before being admitted to the examination. The bulk of this experience must be supervised and certified by a registered architect.

"The engineer-in-training has similar requirements to meet for examination. However, the intern-architect is faced with a more difficult challenge. First, he is in an organization which is primarily manned by engineers, and the small number of available licensed architect supervisors in the Air Force places limits on where an intern-architect might obtain needed architectural supervision. Second, the required experience is so specific (down to the minimum number of hours drawing construction details, for example) that the average intern officer cannot accrue his certified time and obtain the well-balanced organizational experience needed for career objectives.

"In addition," Hockett continued, "most architectural educations are designed to prepare interns for further development under registered architects, and although there is a great deal to be learned from the engineering disciplines, without professional architectural interchange and guidance, this development from intern to architect is inevitably stunted.

"Out of concern for these people, we've developed a TAC program to give them some of the needed experience through IDP training teams. These teams are composed of interns TDY to HQ TAC for 120 days to design a project at a TAC base while under my supervision. The design effort is supplemented by a series of seminars given during their stay here. This concept has several benefits. The interns gain certified experience not available at their home base; they learn from each other while solving a team problem; and they produce a constructable design for a needed project. The first team is presently on board and we're very encouraged by their enthusiasm, their learning experiences and the professionalism in their work."

TAC Architectural Standards

Although the Design Team isn't involved with the development of TAC architectural standards, Hockett is familiar with the use of interior and exterior materials and color for buildings in TAC. "One of the standards adopted across the command," he said, "concerns the use of exterior paint. I believe most of the coatable facilities in TAC have been painted in recent years. Within each base, the colors and design motifs have served to bring a noticeable sense of congruence to the base as a whole, taking a menagerie of forms constructed over many years and giving them a new group identity that works. A great deal of concern and energy went into this effort and although each base has its own painting plan, there are enough similarities between bases to establish a TAC-wide image without significant cloning. This was not replanning or rebuilding by any means, but it was a successful way to begin providing compatible environments in a short time at minimal expense."

First Honors in 1980

Hockett received the 1980 U.S. Air Force Design Award, First Honor, for his design of the Consolidated Hobby Shop at Tyndall AFB, Fla. As a show of his pride and affection for this particular design, Hockett has included this building in the series of photos displayed in his office.

Asked what was significant to him about this project, Hockett answered, "Providing a comfortable 'people' place in a very warm climate presented a problem I wanted to help solve architecturally. It was also meaningful because there was the opportunity to respond directly to the environment as well as to the interior function of the building.

"You can talk about criteria and in some cases the forces that influence the process of designing a building. At Tyndall there were three major forces, or categories, of criteria. One, the facility was to be part of a 'walking' mall. (This mall is part of the Tyndall Community Center Master Plan not yet implemented.)

"Two, the location is in the Florida panhandle which has very warm summers (average temperatures ranging from mid 80s to high 90s). Handling the sun and its energy required a significant design effort.

"Three, this was the installation of a 'combined' hobby center. It was to include arts and crafts and the auto hobby shop function in the community center. You find very few auto shops sitting next to commissaries, post offices and similar buildings because of the nature of the work done and visual impact of this facility type.

"So, the challenge was to provide a form that would act as a focal point at the end of the mall while responding to the natural environment — particularly the sun — and to the ground plane in the best way possible. The form also needed to provide an audiovisual barrier between the proposed activities of the community center and the auto/hobby center.

"The result was a functional building that responds well to its environment."

2nd Lt. Robert T. Kokayaski is one of three intern-architects currently working on the Engineering staff at HQ TAC.

Architectural Photography

Not only a hobby, but part of his career, architectural photography is Hockett's favorite pastime. "I began taking serious pictures," he said, "20 years ago and have photographed commercially since 1969. Architects communicate their design intentions graphically. They also use drawings to describe their final product — the constructed building. However, as we experience buildings mostly in visual terms, photography is the primary medium used to show the final product to those who haven't experienced it firsthand. The successful photographic product describes the essential character of the facility in an aesthetic way. In the Air Force, some of our finest design and construction efforts go unrecognized due to poor visual communication. This is especially evident in the USAF Design Awards Program. My goal in lecturing on architectural photography is to increase awareness of the subject; to change how people think about this kind of visual communication; and hopefully bring about increased recognition of our best facility acquisition and maintenance efforts."

Having done extensive work as a commercial photographer and exhibited his works at fine arts museums, Hockett explained how he links this expertise to his work as an Air Force architect. "I've lectured on the subject at AFIT, the 1982 Air Force Design Conference and TAC Engineering and Services conferences. I've also gone into the civilian community to promote the important connection between photography and architecture."

Intern-architect 2nd Lt. Lawrence Brown works a project under the supervision of Allan Hockett.

Successful?

When asked if he considered himself a success, Hockett replied, "I believe I'm doing more of what I want to do than I would be in other circumstances. That's probably how I look at the word 'success.' For years the quality of the Air Force-built envrionment was less than its civilian counterpart. Much of this gap has already been closed. Now I see the Air Force, particularly TAC, striving even more to meet goals established in the civilian sector and markedly improving the quality of life for everyone who lives and works in our environment. I feel really good about being a part of this."

ESQworld

People, Places & Events of Interest

Brig. Gen. Shaw Retires

Brig. Gen. William M. Shaw Jr., Deputy Chief of Staff for Engineering and Services, Air Force Logistics Command, Wright-Patterson AFB, Ohio, retired September 15 in ceremonies officiated by Gen. James P. Mullins, commander of AFLC.

General Shaw began USAF service in 1955. He has served in flying operations, civil engineering and logistics. He is a master navigator with 5,200 flying hours. His military decorations and awards include the Legion of Merit with an oak leaf cluster, Meritorious Service Medal with two oak leaf clusters, and Air Force Commendation Medal with three oak leaf clusters. During the retirement ceremonies, the general received the nation's highest noncombat decoration, the Distinguished Service Medal. The medal honored General Shaw for dynamic leadership resulting in major improvements in the Foreign Military Sales Program, energy conservation, operations and maintenance of facilities, quality of life programs, environmental programs, and the automation of Engineering and Services functions.

General Shaw, while the assistant DCS/Engineering and Services at HQ AFLC, helped give definition and direction to one of the largest military sales programs in U.S history, Peace Hawk. The acquisition of the F-5 fighter system by the Saudi Arabian Air Force required extensive new construction at three main bases from which it operates. An innovative approach to construction acquisition was funding the project through the Northrop Corp., vendor for the F-5.

General Shaw left Wright-Patterson AFB and became the commander of AFLC's Logistics Support Group in Saudi. While there, he oversaw Peace Hawk V construction, which includes some of the finest support facilities constructed anywhere in the world in recent years, all funded with Saudi money. Then a new project, Peace Sun, was initiated as the Saudi Air Force acquired the F-15 Eagle. The general further defined the facilities requirements, including extensive modernization at each of the operating bases. This was necessary to support both of the weapons systems and greatly improve the overall effectiveness of the Saudi operations.

Both projects involved extensive coordination with the Foreign Military Sales Program leadership, including AFLC's San Antonio Air Logistics Center, system manager of the F-5; Warner Robins Air Logistics Center, system manager of the F-15; the International Logistics Center at Wright-Patterson AFB; and Headquarters U.S. Air Force. Total value of the two programs now amounts to nearly $1.8 billion in construction and programming effort.

7625th First to Orbit Mother Earth

by 2nd Lt. James J. Brendlinger, Jr.

Space . . . The final frontier. How far will man reach into the vast ocean of opaque blackness seeking that touch of light? How far will the Air Force become involved in this program during the years to come?

With the Space Shuttle Program in full-swing, serious thought is being given to space stations in orbit. These stations will probably be prefabricated on earth and put together like an erector set once in space. Who will construct these massive satellite stations? A civil engineering squadron?

Granted the idea sounds far fetched, but those with the 7625th Civil Engineering Squadron at the Air Force Academy don't think so. They've already taken the first step, small though it might seem.

The shuttle carried some Academy experiments, the first developed by cadets for space. There was enough room for added payload, so the 7625th Prime BEEF patch and decal, cadet patches and decals were included.

When the Challenger returned, NASA sent the patches to the squadron with a letter certifying that they were flown on board the Challenger April 5-9

The idea was the brainchild of the Academy's "creative awareness" committee, including Col. Dibrell C. Stowell, deputy chief of staff for Civil Engineering; Lt. Col. Ronald J. Zwolinski, director of Operations; and William C. Winter, director of Industrial Engineering. First Lt. Paul Scott, Prime BEEF officer, was the project officer.

A civil engineering squadron in space!

Maybe it isn't so far-fetched.

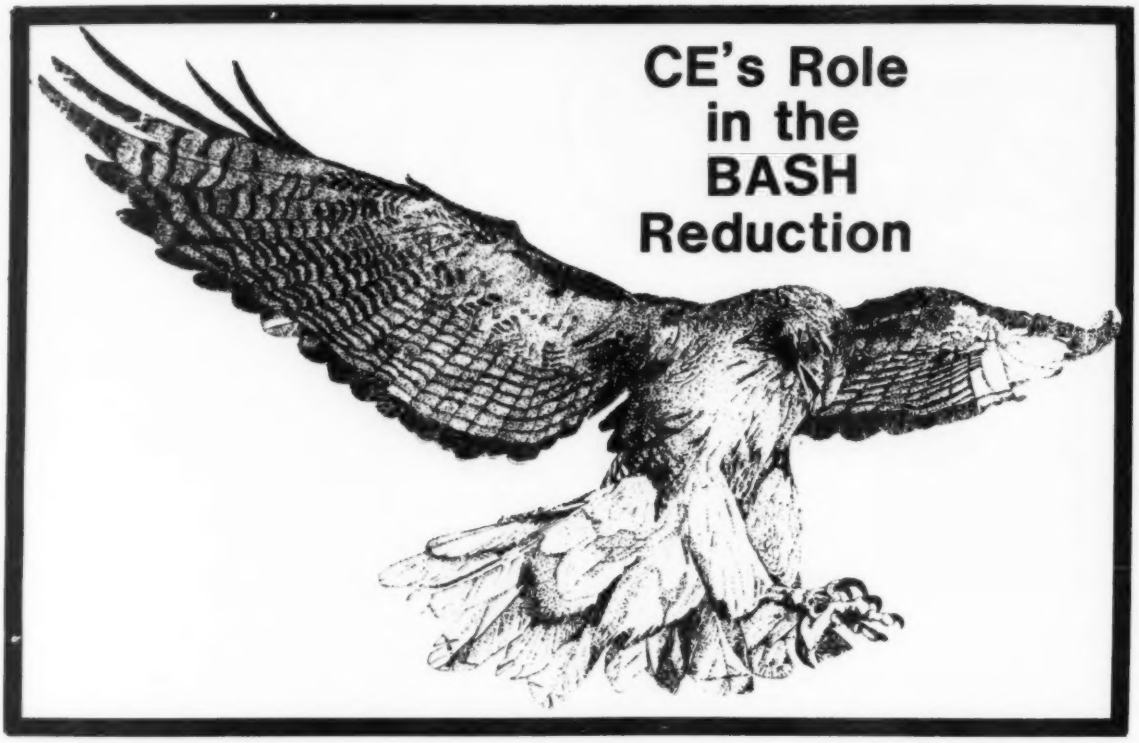
Engineering and Scientific Career Continuation Pay Centrally Identified

Headquarters Air Force Manpower and Personnel Center, Randolph AFB, Texas, recently announced that they have centrally indentified officers eligible for Engineering and Scientific Career Continuation Pay (ESCCP) during the quarter Oct. 1-Dec. 31, 1983. Officers who feel they meet all of the eligibility criteria (but were not centrally identified) for the program, can submit a letter of eligibilty request per AFR 36-31, Atch 2. All officers holding an engineering or science degree and who meet the criteria are encouraged to submit this request. Most criteria are contained in AFR 36-31. Requests will be reviewed on a case-by-case basis.

Eligible AFSCs include 26XX, 91XX, 301X (fully qualified as 3055), 27XX, 28XX, 309X (fully qualified as 3055), 29XX, 305X, 51XX and 55XX.

Eligible degrees are in Electrical Engineering, Electronic Engineering Technology, Electrical Technology, Mechanical Engineering, Astronautical Engineering, Aerospace Engineering and Aeronautical Engineering. Architects and architectural engineers are not eligible for ESCCP as of Oct. 1, 1983.

The ESCCP is subject to change with each quarter, based on the needs of the Air Force. For further information, contact the special actions unit at the central base personnel office, or HQ AFMPC/MPCROS-5V, Capt. Segal, AUTOVON 487-3834.



CE's Role in the BASH Reduction

by Maj. Geral L. Long

Aircraft and birds — how can engineers help keep them apart? On the airfield, the potential for a disastrous bird strike is often directly related to management practices by civil engineering people. The extent of the problem can be serious. From 1980-1982, 50 percent of the Air Force's bird strikes occurred on or near the airfield. The land surrounding an airfield is attractive to birds because it may supply food, shelter, or a safe resting place.

Usually, the greatest problem a base has when new bird hazards develop is a lack of organization to deal with the situation, both in the form of a plan and people to respond. A Bird Hazard Reduction Plan should be developed to meet these needs. It is prepared by a bird hazard working group comprised of people concerned with airfield bird control. These include safety, base operations and civil engineering. While the base safety office is normally the OPR for program management and the working group, civil engineering is an integral member.

Civil engineering people are more effective as members of these groups if they are aware of these bird attractants and take proper steps to reduce airfield bird populations. Bird attractants result from edge effects, improper turf management, standing water, sewage lagoons, sanitary landfills, agricultural crops, vertebrate and invertebrate pests and wildlife refuges.

The Air Force Engineering and Services Center's Bird/Aircraft Strike Hazard (BASH) team, at Tyndall AFB, Fla., has identified some proven management techniques to discourage birds from inhabiting airfields.

Edge Effects

The greatest number of animals are found in the zone where vegetation changes from forest to brush or from brush to grass. To reduce bird problems, edge effects should be kept to a minimum. Single trees or snags provide perches to hawks or owls and should be removed. Brush and weeds should be reduced to maintain the airfield in the most uniform condition possible. Airfields with clumps of brush among grass increase bird habitat.

Civil engineering people must become familiar with airfield turf species and manage airfield vegetation to achieve uniform cover. Proper turf management helps eliminate necessary cover for many birds and rodents. Selective treatment with fertilizers and herbicides can result in a more vigorous turf. The turf will also be easier to manage if the number of species is kept to a minimum.

Turf Management

One of the most important aspects of bird reduction on airfields is maintenance of grass at the proper height. Flocking birds must see each other to maintain flock integrity. Tall grass 6-12 inches (15-30 cm), IAW AFM 126-2, blocks their view and birds are not likely to remain where they cannot see each other or potential predators.

While tall grass also makes food more difficult to find, it does harbor increased rodent populations which attract hawks, owls and other birds of prey.

The grass should be cut before seed heads develop which will attract grain-eating birds. A compromise height of six to 12 inches is usually recommended, depending upon the land conditions, the airfield grass species and the bird species causing the hazard.

It is always important for proper mowing equipment to be available for the particular problem. A wide rotary mower with an adjustable blade height of over seven inches is best suited to maintain proper grass height on airfields. A tractor-drawn, hinged, fold-out (batwing), mower (NSN 3750-00 828-1462 in TA 008) meets these criteria. This mower can cut a five to 25 foot swath at heights up to 15 inches.

Landscaping

Proper planning can reduce landscaping as a potential bird attractant. Shrubs, ornamental trees, shelterbelts, hedgerows and noise suppression barriers are important plantings on a base. However, this type of vegetation can influence bird populations and movement near airfields.

The airfield and clear zone are not appropriate places for landscape plantings because it increases available food and habitat. When planting shrubs on the rest of the base, their distance to the airfield must be considered and their attraction to birds kept to a minimum.

Select those species that do not produce fruit. Shrubs that produce fruit during winter are especially bad. Ripe berries can be intense bird attractants for short periods each year.

Trees planted close together when young often intermingle as they mature and create a contiguous canopy. This close, dense foliage attracts birds and is ideal for shelter and nesting.

Trees, anywhere on base, may be attractive to birds as desirable roosting sites. Blackbird and starling roosts are particularly hazardous because of the large number of birds (sometimes numbering in the millions) that may exist in a single large roost.

This roosting situation may occur where it is undesirable to remove the trees. For example, large trees that line a street or provide shade in a housing area are assets that should be retained. It is possible to discourage bird roosting but still keep the trees. The technique of thinning branches from each tree can be as effective as tree removal and has been successful in several city parks. Qualified tree trimmers perform the work and leave the trees with the same outward appearance and shade-producing qualities (Figure 1). The difference is that many of the small branches inside the canopy used by birds as perches are removed.

Several years ago, one of our southern bases was faced with this dilemma. Huge live oaks that lined the main boulevard of the base became infested with blackbirds each winter. Active control with pyrotechnics, distress tapes and live ammunition was unsuccessful in roost disruption. Finally, qualified tree trimmers removed a portion of the tree canopy. Today the trees are still a beautiful part of the base, but the huge bird flocks have gone.

Reforested areas may attract birds. The types of trees planted for forest production are often different from those in the surrounding community and may serve as bird roosting sites. For example, the dense canopy in a planted pine forest within a hardwood region may provide ideal roosting sites. If this situation should occur, roosting can usually be discouraged by thinning the roosting areas (removing certain trees to produce an open-stand canopy).

In the early years of a planted forest, brush may grow between the trees and create a wildlife habitat near the airfield. To avoid producing additional habitats, tree rows should be spaced to allow mowing between rows. This concept of management applies only to sites near airfields.

Standing Water

Fresh water is one of the most important airfield bird attractants, especially in arid regions or near the seacoast. Standing water makes complete mowing impossible, thereby providing additional cover for birds and acting as a breeding place for insects, amphibians and other food sources for birds.

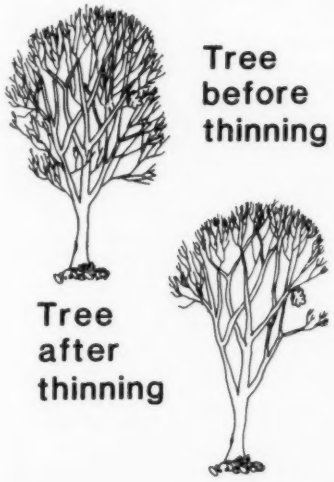
After heavy rains, airfield areas with chronic standing water should be marked. When dry, these areas should be filled, leveled and reseeded with grass to match the rest of the airfield. Airfield drainage ditches should be steep to minimize the surface area of the water and still allow proper drainage.

Wading birds such as herons and shorebirds are less likely to use deep water. The ground around drainage ditches should be graded to a 5:1 ratio to allow mowing up to the edge of the ditch. Drain pipes, culverts and screens must be kept clear of debris so drainage is not impeded.

Sewage Lagoons

Waterfowl and shorebirds are often attracted to sewage holding ponds. Birds use water for resting and sometimes as a food source. Sewage lagoons are most attractive in arid climates. Because most wading birds are unable to feed in deep water, ponds designed with steep sides and little surface area reduce the attraction to birds.

Pond location is very important. Ponds should be located as far from the runway as possible and should be situated so that birds moving from off-base areas to ponds do not cross runways (Figure 2).



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Sanitary Landfills

When disposed of improperly, organic wastes often provide an accessible source of food for birds. Many of our Air Force bases have landfills located near the runway.

A 1980 survey by the BASH team showed that 50 Air Force bases had sanitary landfills located less than 10,000 feet from their active runways. An Environmental Protection Agency (EPA) regulation prohibits locating a landfill within 10,000 feet of active runways used by jet aircraft at public use airports, if it increases the likelihood of birdstrikes. While this regulation does not specifically apply to Air Force installations, some states have adopted the same criteria for DOD facilities within their jurisdiction as it is an excellent planning guide.

The Air Force usually cannot control land use off-base, but before landfills can be opened, the operator must obtain a state permit and hearings are held concerning the potential environmental impact. The environmental planning section of civil engineering, flight safety office, and the office of the staff judge advocate should work jointly to present the Air Force position on potential bird hazards.

The civilian community is often recep-

tive to Air Force safety programs regarding landfills. At one of our midwest bases, a sanitary landfill was proposed at an off-base location just over 10,000 feet from a runway. Although the location met the EPA requirement, the city commission was persuaded to locate the landfill elsewhere after Air Force representatives voiced their concern. In the United Kingdom, a sanitary landfill near one of our bases was closed because of the birds it attracted.

Proper landfill operation (covering refuse immediately after dumping) can reduce the attraction by denying birds easy access to food. In addition, birds anticipate regular dumping schedules. If refuse is dumped at varying times or at night, fewer birds will be attracted. Active controls such as pyrotechnics, bird distress tapes and live ammunition will also reduce the number of birds coming to the site.

Agricultural Crops

Many bases have airfield programs involving leasing out grazing and croplands. This reduces maintenance costs and provides additional revenue. It is important to create a lease program that will benefit both the Air Force (reduction of maintenance costs and bird hazards) and the lessee.

One method of achieving both results is to lease for more than one year. For example, a lessee has more incentive to manage the airfield grass properly if leased for a five-year period. The lease may require the lessee to fertilize and apply herbicide to the field to improve long-term yields. As a consequence of increased care, the field turf will become more vigorous and uniform.

The types of crops grown and the agricultural methods used affect local bird populations and their movements. Grain crops are not recommended because harvest methods expose a ready food supply. Hay, alfalfa, cotton and flax are the best crops from a bird avoidance standpoint.

Conditions that make the airfield unique can attract birds. Therefore, airfield crops should not be radically different from the crops of the surrounding community.

Cultivation may attract birds by exposing large numbers of insects or earthworms. Harvest and planting schedules can also affect the number of birds the airfield attracts. For example, if an airfield hay crop is harvested before or after other hay crops in the region, large numbers of grasshoppers may be exposed on the airfield that are not exposed on other fields. This might provide an unusually intense bird attractant that would normally not exist.

Agricultural planners should also consider the local flying schedule. Planting, cultivating, harvesting or burning may temporarily increase airfield bird attractants. These activities should be done on weekends or during other periods of reduced flying. Agricultural practices should be closely monitored by airfield management in cooperation with civil engineering.

Pest Control

Invertebrates and rodents provide important food sources for many birds. Civil engineering's pest management section should periodically survey for and reduce these pests when required. When airfield pests attract birds, the use of pesticides and traps can reduce their populations. Insecticides may be used on grasshoppers, or rodenticides may be needed to control rodent populations. Only EPA approved pesticides are authorized, and they must be used strictly according to label instructions.

Wildlife Refuges

Since most Air Force bases are located away from urban areas, the land surrounding them often supports wildlife populations. These areas make excellent wildlife refuges and are often developed for this purpose.

Due to urban development and loss of wetland habitat to agriculture, refuges often concentrate huge waterfowl populations that can present severe bird/aircraft hazards. When refuges are proposed, meetings are held by the U.S. Fish and Wildlife Service or state agencies to discuss possible objections to refuge locations. The Air Force should participate in these meetings.

In some cases, wildlife refuge development may be more desirable than conversion of the land to agricultural use. The management of refuges can greatly influence the size of bird populations that use the area. The BASH team can assist with refuge design, operation and other considerations, and should be consulted whenever refuges are proposed.

No single management practice works each time for bird problems, and all the solutions have not yet been found. In some cases, a short-grass policy (or even no grass) may be effective in reducing birds. Landscape techniques vary in different regions, and pest control is not the same everywhere. Each situation is unique and requires careful planning before long-term commitments of base resources are made. Assistance for this planning is available from the BASH team, MAJCOM agronomists and entomologists, the U.S. Fish and Wildlife Service and respective state game and fish departments.

Even with good planning, the effort needed for implementation must come from base people. Good, responsible engineering practices help keep flight safety from . . . ***going to the birds.***

Capt Frederic G. Wilson receives the 1982 Kolligian Trophy.

Capt. Frederic G. Wilson, a weapons system officer assigned to the 124th Tactical Reconnaissance Group (ANG/TAC), Boise, Idaho, received the Koren Kolligian Jr. Trophy for 1982.

Captain Wilson was cited for his airmanship in coping with an in-flight emergency in an RF-4C aircraft April 8, 1982. While navigating on a low-level, high-speed mission, Captain Wilson's aircraft was struck by a large bird. The impact destroyed the large left panel of the front windscreen, gravely injured his pilot, severely damaged the instrument panel and front seat ejection system, and destroyed Captain Wilson's helmet visor. Because of blood and bird remains, Captain Wilson could see outside only through a small spot on the right side of the rear canopy.

Immediately taking control of the aircraft, he climbed to a safe altitude, turned toward a nearby airfield and transmitted Mayday calls to air traffic control agencies.

A chase plane was directed to the disabled craft, and the injured pilot regained sufficient consciousness to lower the gear, flaps and arresting hook.

Although Captain Wilson had no pilot training or experience, he decided to attempt a most difficult night landing from the rear cockpit of the RF-4C. Officials say he flew an excellent formation approach, touched down in the center of the runway, snapped the throttles to idle and engaged the arresting cable. Unable to shut down the engines by himself, Captain Wilson held the brakes until the rescue crew arrived.

Presentation of the trophy to Captain Wilson took place August 18 in the Secretary of the Air Force conference room in Washington, D.C.

The trophy was donated by the Kolligian family in memory of their son, 1st Lt. Koren Kolligian Jr., USAF, who was declared missing in a T-33 off the coast of California in 1955. The trophy was established to recognize outstanding feats of airmanship by an individual aircrew member in averting an aircraft accident or minimizing its seriousness.

Birth of a Bare Base CPG

by Col. William E. Bradkin (USAFR)

For a number of years, Air Force civil engineers have worked with concepts requiring support operations to be set up at "bare base" locations. Starting with very little in the way of facilities, they have been required to generate a base facility that can support combat aircraft operations.

The need for written guidance for the deployment and employment of contingency equipment was recognized by the Directorate of Readiness, Air Force Engineering and Services Center, Tyndall AFB, Fla., and an effort was undertaken to develop a comprehensive set of instructions, drawings and schedules. The final product – a Bare Base Conceptual Planning Guide (CPG) – would provide guidance to field units, engineering planners, logistics planners, and others involved in bare base activation.

The Design Team

Recognizing the broad range of engineering disciplines required to develop the CPG, not to mention the magnitude of the job, the reserve components (Air National Guard and Air Force Reserve) were called upon to come up with a team which could undertake the task. The team was headed by Lt. Col. Gordon J. Buchanan, commander of the 231st Civil Engineering Flight, Missouri ANG, who in private life is a principal in his own engineering firm. The balance of the team represented the widest technical and geographical spectrum imaginable, from Maine (101st CEF, Maine ANG) to California (4th CEF, AFR, McClellan AFB). Team members included civil, mechanical and electrical engineers, architects, engineering assistants and support personnel. All of them made arrangements to be away from their homes and businesses for the duration of the effort. When the job was done, they doffed their uniforms and returned to civilian life.

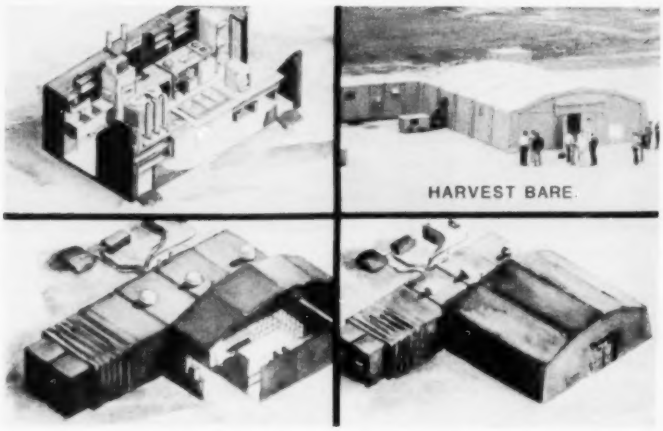
The Effort

The first phase of the task was to establish the parameters and assumptions upon which the generic design of a bare base could be planned. Base populations drawn in multiples of 750 up to a maximum of 15,000 would support a hypothetical mix of aircraft. A skeleton of the guide was established, to be filled-in during the next phase.

In the second phase, the team convened at Tyndall and the detailed engineering got under way. Base layouts were drawn for the various options, with locations pinpointed for all supporting facilities including operations, maintenance, supply, fuel storage, munitions storage, billeting, and utility systems – not to mention the countless other things needed to transform a patch of land into an operating air base.

The team produced water supply layouts and sewage collection plans, along with primary and secondary electrical distribution layouts. They calculated quantities for such items as cable, piping and fittings for water and sewage. Requirements for fuel bladders and required earthwork were also analyzed. They computed time-phased manpower levels and established civil engineering manpower requirements. In some cases they modified construction and distance planning factors to keep utility system network requirements to a minimum.

Typical of the many trade-offs addressed by the team was the subject of required distances between individual structures and between facility group areas. AFM 86-3 specifies what these distances should be, yet other constraints on the utilities network, based on shipping and construction times, required a number of these distances to be reduced. Many such compromises had to be made as the design took shape.



Col. William E. Bradkin is commander of the Fourth Civil Engineering Flight, McClellan AFB, Calif., one of six CF-4 teams assigned to the reserve components. He earned his bachelor of science degree in Civil Engineering from Union College, N.Y., and his master's degree in Nuclear Engineering from the University of California, Berkely. He is registered Civil Engineer and Mechanical Engineer in California. In civilian life, Colonel Bradkin teaches engineering and mathematics at American River College, Sacramento.

Conclusion

As the team prepared to leave AFESC, Colonel Buchanan commented, "This was a fine chance for us to get involved with the active force on a high priority project of some real substance. We came up with all the needed talent and we can be proud of the results." Added Lt. Col. Travis Windham of AFESC's Readiness Directorate, "It's reassuring to know that this kind of engineering talent is out there in the Guard and Reserve, ready to jump in on short notice. I can guarantee you we're going to be looking for this kind of help again." And the following comment came from Col. Jim Penn, director of Reserve Resources for AFRES Engineering and Services, "I know the reserve components can come up with the talent to handle any engineering problem that comes our way. Any time the Center defines the need and provides the man-days, we're ready."

BARE BASE:

A New Frontier

by Lt. Col. Clifton T. Windham, and Joseph H. Smith

With growing reluctance on the part of many third world nations to allow establishment of foreign military bases on their soil, a "bare base" concept has emerged as a viable solution to a difficult problem — peacetime planning for contingency situations.

A bare base, by definition, is a site with a usable runway, taxiway, parking areas and a source of water that can be made potable. It must be capable of supporting assigned aircraft; providing landing/recovery surfaces; and providing other mission essential resources such as a logistical support and services infrastructure composed of people, facilities, equipment and supplies. This bare base concept requires mobile facilities, utilities and support equipment that can be rapidly deployed and installed, and be available to transform — virtually overnight — undeveloped real estate into an operational air base. Fortunately these kinds of assets have undergone nearly three decades of intense research and development.

Early Tactical Air Mobility

The requirement for mobile air bases sprang out of necessity with the advent of modern air warfare. During World War II, mobility concepts specified that ground forces advance in increments by surface means. The advancing force had to continue the offense. At the same time they were required to establish new operating bases. The tactical air units moved from one forward operating base to another in order to keep up with and provide air support for the advancing troops. Tactical units had two choices — build base facilities or erect tents and substandard billets and operate and perform maintenance out in the open.

This vicious cycle repeated itself whenever battle zones changed. Similar problems were experienced in Korea.

It wasn't until the 1950s that military planners developed techniques to prepackage base support equipment — predominantly World War II hardware. This equipment consisted mainly of tents, field kitchens, medical facilities, power generators, cots, desks and other equipment. It was bulky, heavy and required excessive manhours to position and erect. This initial deployment kit was given the nickname, Grey Eagle.

In the mid-1960s, more equipment was added to the package. Some was redesigned to make it more air transportable, and the name was changed to Harvest Eagle. Harvest Eagle was tested many times in worldwide deployments including Southeast Asia.

A major innovation emerged in the late 60s when a new concept for mobility was born. Under this concept, all facilities and equipment would be lightweight, modular and designed to be C-130-transportable. Some shelters would be hard-wall and serve as their own shipping containers. Some of the mobility hardware would interface with weapons systems while other hardware would be developed to take care of transportation, housing, messing, aircraft maintenance, airfield lighting, power, water, sewage, heating, cooling, medical and civil engineering needs. This concept would have everything necessary to support a deployed force in the most austere environments.

To test this concept, exercise Coronet Bare was launched in October 1969 to evaluate new prototype equipment which was called "3782 equipment" after the contract number under which it was purchased. In November 1970 the full-scale deployment Heavy Bare exercise success-

fully validated the bare base mobility concept of being operational within 72 hours. After validation, the program became known as "Weapon System 437A, Harvest Bare."

Today's Tactical Mobility Concept

The concept of the bare base is more important now than ever before. While many foreign countries resist development of major fixed installations on their soil, they themselves are subject to internal and external aggression. As a rule these underdeveloped nations possess runways, taxiways and air terminal facilities which could be offered to our forces during contingency situations. In fact, there are some 1,200 such bare bases in the free world which could support air operations even though many are limited and inadequate. Since most of these underdeveloped nations are subject to aggression, the Air Force must be able to deploy and operate from their facilities.

Today's concept is to rapidly deploy a force, complete with shelters and support facilities, capable of independently supporting and launching sustained combat operations with the same independence as fixed theater installations. The assumption is that tactical forces will continue to have a bare base requirement to conduct sustained air operations on a worldwide basis in support of national policy.

The nucleus of today's bare base infrastructure centers around the enhanced version of earlier Harvest Eagle and Harvest Bare equipment. This equipment has undergone several generations of modernization. Conversely, the concept of employing this equipment remains unchanged. Harvest Eagle, for example, consists mainly of soft-wall shelters and support equipment generally used on deployments of short duration. One complete package provides enough tents and housekeeping items to beddown a force of 1,100 people. Harvest Bare, on the other hand, centers around hard-wall construction and modern technology. In addition to housekeeping, this package includes vehicular support, general aircraft maintenance, specific weapon systems, and a broad base of logistics support for sustained operations of a 4,500-person wing. Due to the high cost of equipment and airlift, Harvest Bare is usually reserved for those deployments of extended duration.

Conceptual Planning Guide

The somewhat ambitious mobility concept presents problems and challenges to engineers, planners and developers who have the ultimate responsibility of bare base development. To aid them in their endeavor, the Readiness Directorate at the Air Force Engineering and Services Center, Tyndall AFB, Fla., called together a composite team of architects; civil, mechanical and electrical engineers; and engineering assistants and support personnel from the Air Force Reserve and Air National Guard, and charged them with the responsibility to develop a conceptual planning guide (CPG). (See related story, page 23.)

In a nutshell, the CPG should prove invaluable to units with a specific operational plan tasking to some desolate outpost in some far-out corner of the world. It provides them with a step-by-step description of the type of shelters, utilities and support items that are available for bare base as well as the procedures for installing and erecting these assets. It provides a concept of employment and a sequence of bare base construction. The CPG is a road map that leads the bare base planner from the initial planning response phase to the material acquisition phase. It is, in effect, a checklist to ensure that each crucial item which affects the base's ability to survive is covered. While it was developed for use anywhere in the world, it deals most heavily with the Southwest Asian theater of operation. Arctic and tropical environments will be addressed in future, follow-on efforts.

The CPG does not present the final or specific solution to a given problem. It is not expected to solve all the anticipated problems or to anticipate all the problems that might be encountered. The CPG does address those that most likely would be encountered and gives guidance, as a checklist does for a pilot, so some important aspects of the task will not be overlooked.

Site Specific Planning

Additional data must be gathered to supplement the CPG since it does not take into account any specific site characteristics such as existing facilities, airfield configuration, topography, climate, soil conditions, or vegetation. Supporting major commands with their deploying wings have the primary responsibility for developing site specific layouts. They must gather this extraneous data from intelligence sources prior to laying out their plans. This is important since a well-planned and executed deployment hinges on the planner's ability to produce a comprehensive site layout, complete to the very last detail.

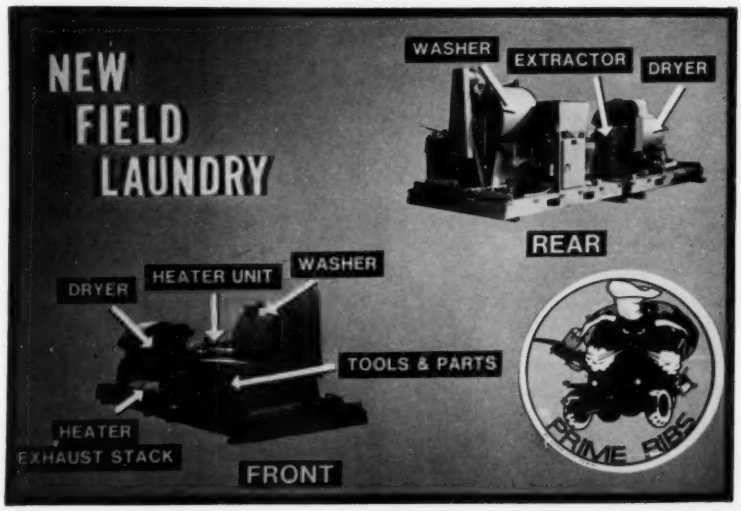
Data Gathering

One of the first pieces of necessary information to obtain is the threat analysis for the bare base. It is essential to know whether the base is located in a forward or rear area, even when the distinction between the two may be blurred. The reasons are threefold:

- Aircraft must survive while on the ground;
- Aircraft must be able to get airborne to perform their mission during or after attack;
- Logistics infrastructure must survive to sustain future air operations.

A threat analysis will determine whether facilities will be dispersed or non-dispersed, whether electrical and water plants will be dispersed or centrally located, and whether revetments and rapid runway repair sets will be required. In some of the more forward areas it may be necessary to plan camouflage and decontamination capabilities.

Topography data should reveal prevailing wind direction and expected velocity, humidity, temperature extremes, annual rainfall, natural slope of the terrain, soil characteristics and longitude and latitude of the bare base site. This data is required in order to properly site-plan sewage lagoons downwind, determine air conditioning and heating requirements, construct cantonment areas away from



natural water drainage during flash floods, determine the effectiveness of evaporative cooling towers, determine absorption rates of the soil and locate facilities in such a way as to mininize shadows that can be detected through aerial reconnaissance.

It is important in the preliminary planning stages to know the location of existing facilities and utilities. Consequently, any layouts, drawings, aerial photographs, etc., are vitally needed.

Equally important are the lengths and widths of the runway, taxiways, ramps and aprons. Does runway lighting exist? If so, is it adequate? Is there a requirement for aircraft arresting barriers?

What kinds of water sources are available? Is the water fresh, brine or salt water? Does it come from a well, river, lake or the ocean? What is its temperature? How far away is the source? Is the site being developed using hard-wall or soft-wall shelters? If the answer is soft-wall shelters, the latrines will be the field-expedient type. There are many more questions, but the more answers that are provided, the easier the job.

Plans and preparation

Having accumulated as much data concerning the bare base as possible, it is now time to map out the specific details on the base plans. Following guidance in the CPG, planners must develop each of the different systems, keeping in mind that the CPG is the "worst case" scenario. In the CPG, for example, a five-day supply of water is required for each individual on the site. This water may be pumped from a source some two miles away, purified with reverse osmosis units and stored in collapsible rubber bladders. If, however, the planners find that purified water is available on-site in the quantities required, then the requirement for water production equipment falls dramatically.

Priorities cannot be overemphasized during bare base development. The allocation of engineering resources must be balanced between both mission essential and force beddown taskings. Thus, commanders of various organizations at all echelons must understand the importance of establishing clear mission priorities.

Increased engineer requirements, especially during the bare base erection phase, could cause limited engineer resources to be thinly spread. For example, the CPG calls for the individual organizations on base to erect their own shelters with minimal technical aid from engineering personnel. If this requirement is circumvented and the engineers are tasked to erect everyone's shelter, the total impact on scarce engineering resources will cause great delays in establishing utility systems and in the accomplishment of other critical tasks. This could be detrimental to the mission.

Getting It Together

Successfully erecting a bare base within predetermined time schedules depends on many factors controlled outside of engineering channels:

- Mobility assets must arrive in proper quantities and sequence;
- Motorized support equipment such as forklifts, trenchers and trucks must be available in the required quantities;
- Craftsmen must be trained to erect, operate and maintain the bare base equipment.

Getting all of these elements welded together will not be easy. But it must be done because the stakes are too high, the penalties too great, and the margin for error too slim.

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Joseph H. Smith is a program analysis officer assigned to the plans and policy division, Directorate of Readiness, HQ AFESC. He received associate of science degrees in Mechanical and Electrical Civil Engineering Technology and Instructor Technology from the Community College of the Air Force. He received his bachelor of arts degree in General Studies from Auburn University at Montgomery. He served 28 years in the active Air Force and retired as a chief master sergeant in March 1982.

by Eleanor Linder

Courtesy is extremely important in the hotel and motel industry where courtesy and profit have a direct relationship. In commercial industry, guests who are treated poorly usually go to another hotel on their next trip. When employee behavior doesn't measure up to corporate policy, dismissal almost always occurs.

While courtesy in Air Force billeting does not have direct economic impact, it is a very important step in developing a well-lubricated billeting operation. We can benefit from some of the techniques used in industry to encourage courtesy within billeting.

According to Donald E. Lundberg in his article entitled, "Courtesy — The Basis for Good Service," ***Hotel and Restaurants International,*** October 1982, "A climate of courtesy, modeled by management and reflected throughout the establishment, nourishes and reinforces individual behavior patterns of courtesy." Managers and supervisors — through written and spoken words, and non-verbal communications — hold the key to creating a courteous atmosphere.

Courtesy Defined

Courtesy is polite, respectful and considerate behavior toward others. In billeting, it is greeting guests with a smile as soon as they arrive, making eye contact and using their names when known. It is speaking clearly, but softly; it is being specific in giving information or directions; it is listening to complaints and doing something about them; and it is being amiable even if the guest is wrong. This is essential in good customer relations.

Courtesy is saying things like: "Sorry to have kept you waiting." . . . "May I help you?" . . . "I'm very sorry." . . . and "Thank you." It is the pleasant, friendly tone of voice and attentive manner that conveys sincere concern for the guest.

Courtesy is standing erect; being well-groomed; and refraining from chewing gum, eating, drinking or smoking in the presence of the guest.

Why be courteous? The most obvious reason is that it is the happiest way to be. "Manners," said Ralph Waldo Emerson, "are the happy ways of doing things." Courtesy is that social lubricant that can make dealings between people run smoothly.

If you look for courteous behavior, you will see it. Each time you observe it, an expression of approval will usually bring still more of the same. This may be such a simple thing as a smiling nod of approval, a personal "well done" comment, a thank you note, or a formal letter of commendation.

Making Courtesy Happen

How do we make courtesy happen? Psychologists tell us that behavior patterns

such as courtesy are not necessarily inbred, but can be learned through practice. Discussing courteous behavior with staff members and encouraging them to practice individually and as a team helps.

Have you considered providing attractive name tags for the civilian staff to wear? Happiness, for many, is hearing one's own name spoken. If guests can easily read it, they may use the employee's name when talking. Also, guest comments — good or bad — are more meaningful when the employee can be identified by name.

Use incentive programs to get staff participation. A slogan contest might be one way to involve the team — select a permanent slogan or a new one every quarter. A slogan like "Courtesy is our policy" could be printed on signs, buttons and guest information notices. Guests could be asked to vote for the most courteous employee and the winner's picture could be posted in the lobby or submitted to the base newspaper. Employees could nominate courteous guests who could then be sent notes of recognition by the manager.

A guest appreciation day could be held once a month with billeting providing snacks or a cake in the lobby. Snapshots of the guests enjoying the refreshments could be posted in the lobby until the next month. A lot of other good ideas will come from staff members when they get involved in a courtesy campaign.

Developing Concern

Psychologists also tell us that expectations tend to be self-fulfilling. So, if we expect other people to be courteous, they tend to be. A greater sincerity in our concern for others can be developed by becoming more aware of their circumstances and softening our sensitivity to their needs. One way would be to see that we and our staff understand where our guests are coming from.

If the billeting operation is at an aerial port, periodic visits might be arranged to the passenger terminal to watch how the people come and go. Witness the "bag drag" and the processing lines. Ask base operations for a tour and see the crews processing through. Arrange for a crew to brief on a typical over-water mission so their demanding schedules are understood.

If most of your guests arrive by commercial air, when was the last time you and your staff were at the airport to see what it was like, and to be sure you know the fastest route and how long it takes to get there? These are just some ways we can develop empathy for the travelers. There are many other possibilities that fit local situations. But, if there is no real empathy for the guests, efforts to be courteous won't ring true.

Project Warrior

The current emphasis on Project Warrior alerted me to consider how billeting managers, clerks and housekeepers are warriors too — as certainly as the flight and missile crews and others who work daily with weapon systems. If crew-rest is interrupted, a flight mission may be aborted or delayed. If other TDY guests don't get enough rest and sleep, their performance may be less than required for their important duties. It is not easy to rest and sleep well away from home with unfamiliar surroundings, noises, climates and time zones. This is why billeting warriors are so important to the Air Force mission.

Billeting warriors have two targets — one to ***achieve*** and another to ***destroy***. They must provide the most comfortable quarters and restful atmosphere possible while eliminating anything that distracts, disturbs, annoys or irritates their guests. Along with comfortable, clean beds and baths, courteous service is essential. Whatever the type or condition of the quarters, whether in an open bay with central latrine or the distinguished visitor suite, courteous service can make all the difference to the guest. Feeling welcome and cared about is the first step toward feeling relaxed and comfortable in strange surroundings.

The very last thing a tired traveler needs is shoddy treatment at the billeting desk. The first thing they need is to feel that the Air Force takes care of its own. Polite, considerate efficiency at the desk, a soft knock on the door by the housekeeper, the attentive ear of the manager when a guest complains — these expressions of courtesy carry that message loud and clear. Billeting people have a very real part to play in Project Warrior, and courtesy is their essential tool and weapon. We can learn to recognize impatience and criticism in our own thoughts as "the enemy" of our "courtesy campaigning," and not be intimidated into such behavior.

In-House Courtesies

What do the employee break areas and behind-the-scene work areas look like? Are they neat and pleasant? Improving work areas is one way to show we care about the staff and can help self-esteem.

Speaking kindly to the housekeepers and groundskeepers whenever we see them can brighten their day and ours. A small private college has an unwritten code of conduct — "Speak to everyone you meet as you go about your daily rounds." The college is a very friendly place because visitors catch on and follow suit. Courtesy can be catching.

Eleanor R. Linder is assigned to the services division, Directorate of Housing and Services, HQ AFESC. She is a general manager in the Unaccompanied Personnel Housing Program. She has served in Air Force housing positions for more than 20 years. Assignments have included Headquarters Strategic Air Command, Offutt AFB, Neb.; Travis AFB, Calif.; and Hahn AB, Germany. She is a board member of the Professional Housing Managers Association and a recent honor graduate of the Air War College Seminar Program.

UNDERGROUND POL

by Shuzo Kimura

This article is about a serious problem concerning underground accumulation of POL resulting from undetected leaks in piping and storage systems.

Aug. 31, 1981, was a calm morning at Taegu AB, Korea. Suddenly that calm was shattered by several loud explosions. The bursts came from the U.S. Air Force compound, near the main gate and adjacent to a fuel storage area. When the smoke and dust cleared, it was apparent to those passing through and on their way to work that two buildings were totally demolished by the explosions. Three others sustained minor structural damage. Four people were seriously burned. One of the four, an Air Force captain, died.

The Taegu area that weekend had experienced the heaviest rainfall since 1920. More than seven inches fell during the day before the accident. The Air Force compound had seen localized flooding throughout the weekend. Saturated ground conditions had caused vapors from a huge "pool" of undetected underground POL product to vent into an unoccupied building. The vapors accumulated in the tightly closed, unventilated building over the weekend. Then, Monday morning, a spark, created when the light was switched on, proved enough to ignite the accumulated vapors.

Besides the two destroyed buildings, the compound holds six other buildings that house about 100 Air Force people who work in administrative, warehousing and aircraft maintenance functions. One of the first major decisions was whether or not to relocate them and abandon the area.

Before such a decision could be reached, an exhaustive investigation was conducted. Fifty test borings were drilled throughout the area to obtain data on the POL "lens," a mass of POL floating on the top of groundwater (see Figure 1). The investigation revealed:

- The entire compound was part of a World War II bulk fuel storage area. It had been used continuously for storage until the late 1960s when the present buildings were constructed. Old maps show that fuel tanks were at one time located directly over the site of the destroyed buildings.
- An old tank located about 200 feet from the explosion was found to be badly leaking. The tank has since been destroyed.
- All other fuel tanks in the area were tested and found not to leak. Therefore, no added "fugitive" fuel is presently entering the area.
- Latest vapor measurements in the area were negative. Cost to relocate the Air Force-owned buildings to another area would have been at least $5 million. This was not a feasible option, however, since the land for such a move was not available.
- The varying degree of weathering reflected in the samples taken from test

Figure 1

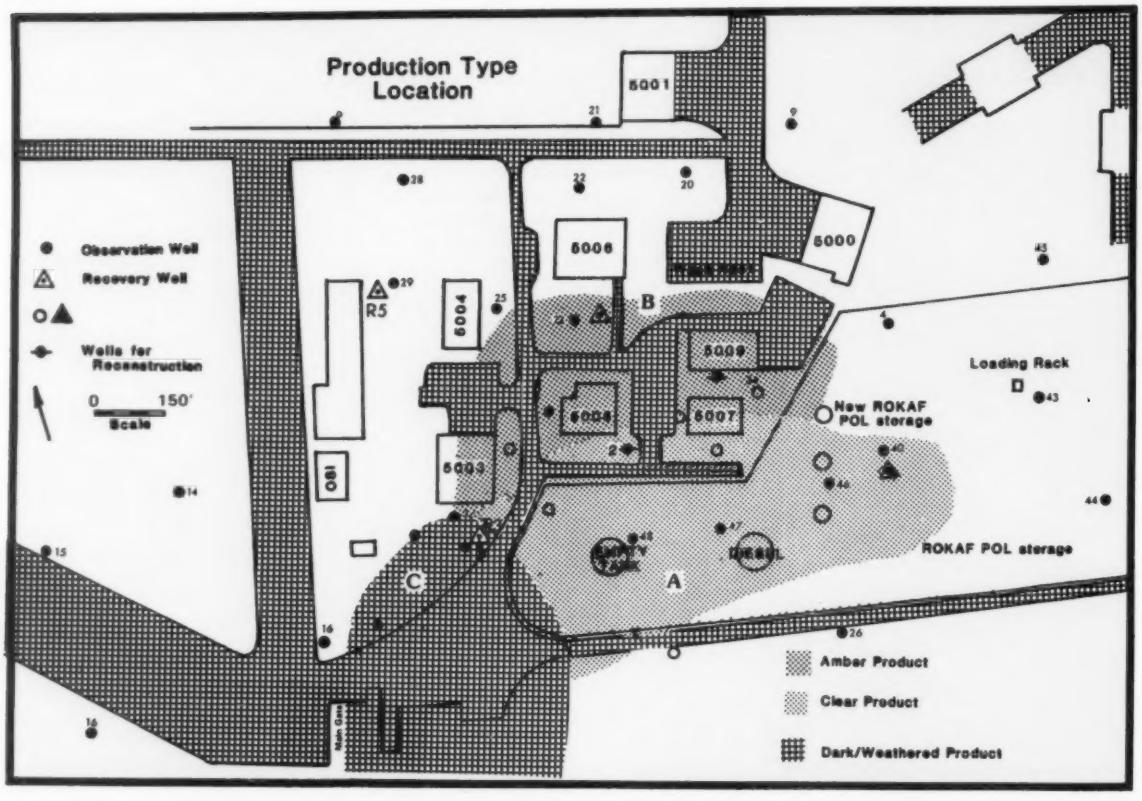
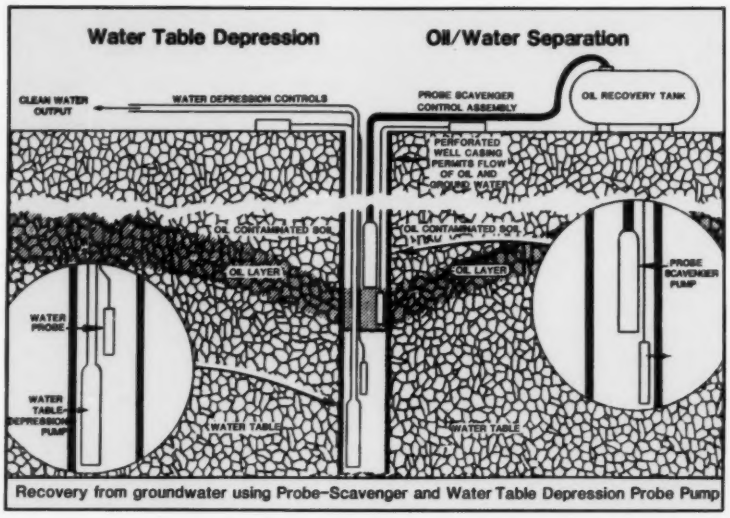


Figure 2



Recovery from groundwater using Probe-Scavenger and Water Table Depression Probe Pump

borings indicated the underground POL "pool" was an accumulation of leaks over the years. The color of the samples ranged from black (indicating the product had weathered over a long period of time and lost all its volatile fractions) to transparent-clear (comparable to the color of JP-4 taken directly out of an operating tank).

Based on the above findings and the fact that daily vapor detector readings in the area continued to remain negative, the compound was declared safe for continued use while a program to remove the POL product was developed and implemented.

In March 1982, a service contract was drawn with Oil Recovery Systems Inc., of Greenville, N.H. This company has worldwide experience in solving oil contamination problems similar to that existing at Taegu AB. Using data from the 50 observation wells, four product-recovery wells were installed (see Figure 1). Each well was equipped with a Probe-Scavenger product-recovery system developed by ORS Inc. The system's concept is illustrated in Figure 2. Basically, this system consists of two pumping units, a "Probe-Scavenger" oil pump and a water table depression pump.

The ORS Inc. brochure describes the concept as:

The Probe-Scavenger features a specially designed probe which differentiates between hydrocarbons and water. This probe prevents the unit's submersible pump from pumping water. The recovered hydrocarbon is pumped automatically to a recovery tank at a rate of up to 35 GPM. The water table depression probe-pump is a submersible water pump with a special probe attachment that permits automatic pumping of water from the recovery well. It is designed so that the pump will shut off when hazardous materials (POL) approach the pump's intake. As this clean water is removed, a "cone of depression" is formed which causes a rapid flow of (POL product) from the surrounding area to the Scavenger in the recovery well. This system can be used at depths up to 180 feet.

At Taegu, the clean water output is passed through an oil/water separator as an added precaution before it is discharged into the Taegu drainage system. The recovery system has been in operation since March 1982. To date, more than 85,000 gallons of product have been pumped out of the ground. The recovered product is being used by the fire department for fire training exercises and is also being blended by the Korean Air Force for boiler fuel. Besides the underground fuel recovery system, other measures taken to insure the safety of the compound area were:

- Permanent vapor detection systems (ERDCO Model 25D) were installed in all existing buildings to give continuous monitoring of the inside air. The multiple sensor systems are equipped with local audible alarms, and are also connected to a base fire alarm system.
- Readings are taken from the 50 observation wells on a weekly basis to monitor variations in the underground POL and groundwater levels.
- As an added precautionary measure, underground vapor removal systems, designed to intercept and remove vapor before it gets into the buildings, are being installed beneath four of the buildings.
- People working in the area are periodically briefed on the ongoing recovery effort. Vapor alarm evacuation procedures have been established.

We have learned from our Taegu experience that "fugitive" underground POL problems can be engineered for recovery, even in populated areas. We have also learned that consultant technical expertise and off-the-shelf equipment are available for such emergencies.

Shuzo Kimura is the environmental coordinator for Headquarters Pacific Air Forces, Hickman AFB, Hawaii. He earned his bachelor of science degree in Civil Engineering from the University of Hawaii. He is also a member of the Society of American Military Engineers.

CESMET tips

The Air Force Civil Engineering and Services Management Evaluation Team (CESMET) reviews, evaluates and assists Base Civil Engineering and Services functional areas in accomplishing their mission in the most effective and efficient manner. Team members are Col. Mario Ginnetti, Team Chief; Lt. Col. Ray Munn, Supply; Maj. Dennis Flynn, Civil Engineering; Maj. Michael Ponsford, Budget; Maj. David Safrit, Contracting; Maj. Kim Wintner, Services; Capt. Ken Mandley, Personnel; SMSgt. Eddie Woodard, Civil Engineering; SMSgt. Joseph Gula, Fire Protection; and MSgt. Tommy L. Campbell, Services.

SERVICES

At many of the bases visited by CESMET, we find that those bases that are "Tops" are the ones that have developed a "game plan" to improve overall operations. Such a game plan identifies problem areas, renovation projects and customer programs, and includes a direction of attack to raise the standards of the operation. This is nothing more than a Management By Objectives (MBO) program, but on a greater scale. It identifies where management wants to be in six, 12 or 24 months. Bases who are employing the use of the game plan are showing there is a definite knowledge of direction and sense of accomplishment. We agree with the use of such a management tool and feel that all Services operations could benefit from it. Keep in mind that the plan should be reviewed periodically to realign priorities on the basis of availability of resource and need.

ENGINEERING — HOUSING MANAGEMENT

We recently learned that the Small Business Administration has established a new business category for prospective bidders on military family housing (MFH) maintenance contracts. Basically, the policy states that only small businesses with total average yearly incomes of $2 million or less for the past three years are considered eligible to bid on new MFH maintenance contracts. Since several of the current MFH maintenance contracts will expire next year, interfacing with contracting now may be appropriate to insure you and the contracting officer have considered this new policy before contract solicitations are developed. In some cases, the civil engineering organization may be able to provide justification to the base contracting officer to raise the $2 million threshold in the solicitation (e.g., extensive construction effort anticipated with floor refinishing or interior painting bid objectives). Look at your particular situation and give the contracting office a call. Work together to determine how you can help each other before a last minute "crunch" occurs.

MATERIEL CONTROL

Backup appliance management is an area where we frequently find an opportunity for improvement in materiel control. Here are some questions to ask to determine if you have a sound operation:

- Is storage adequate, are assets protected, are they commingled?
- Are primary and alternate custodians assigned for your EAID accounts?
- Are records up-to-date?
- Is there a current inventory of on-hand, repairable, awaiting disposal, and on-order assets?
- Are there separate accounts being used for MFH and O&M?
- Are repairable and condemned assets tagged?
- Is the correct percentage (three percent stateside and up to six percent overseas) being applied based upon total base RPIE and EAID assets?
- Is there a distinction between three and six percent day-to-day replacements (EAID) and replacements according to TO 00-25-211 (RPIE)?
- Is the chief of operations being kept informed on the status of appliances at least monthly?

BUDGET

An integral part of budget execution is making your unfunded requirements known. A common denominator of bases visited by CESMET is that Civil Engineering and Services organizations are the major consumers of resources. The other side of the coin also finds these organizations suffering the majority of the unfunded requirements. It is imperative that requirements be identified to the budget office early in the fiscal year. When these inputs reach the budget office, there should be little need for further justification. This is one instance where being a "pro" can result in more money to support the mission. The format for unfunded requirements can vary, but certain information must be presented. The most important part of the narrative justification is the impact statement. As a minimum, you should address in detail "who is affected" and "how it will affect the mission." For further information, contact Maj. Ponsford at AUTOVON 970-6126.

OPERATIONAL CHANGE

A change has been made to the CESMET method of operation. The after-visit memorandum which circulated to the Office of the Air Force Chief of Staff, MAJCOM/CC, and other Air Staff DCSs has been eliminated. The memo has been replaced with a letter from the U.S. Air Force Director of Engineering and Services, to the MAJCOM/DE and wing commander of the base visited. The change was made to allow CESMET recommendations to be worked at the lowest level and to emphasize the CESMET's purpose is to help the base.

North Field RRR Test

by Capt. David Ruschmann

Development efforts in Rapid Runway Repair (RRR), including alternate runway surfaces, have passed another major milestone.

Tests of repair methods and alternate surface materials were conducted in August and September 1983 at North Auxiliary Field, S.C. An F-4 aircraft and both F-4 and F-15 load carts were used in the test.

Load cart tests slabs.

Capt. David F. Ruschmann is a project officer in Post Attack Operations and Testing for the Rapid Runway Repair Branch, HQ AFESC. He holds a bachelor of science degree in Civil Engineering from the University of Massachusetts and a master's degree in Facilities Management from AFIT. He is an engineer-in-training in Florida and a member of the Society of American Military Engineers. His previous tours include MacDill AFB, Fla., Cape Newenham AFS, Alaska, and Williams AFB, Ariz. His previous work at HQ AFESC was with aircraft testing for the Have Bounce program.

Two 50-by-100-foot alternate surfaces were tested — thin asphalt (two inches of asphaltic concrete over six inches of crushed stone base) and stabilized soil (10 inches of soil stabilized with nine percent portland cement). Construction was done by the 823rd RED HORSE Squadron from Hurlburt Field, Fla., under the direction of the Air Force Engineering and Services Center and the Army Waterways Experiment Station. The thin asphalt section used standard methods and equipment. The stabilized soil section required removal of the soil; mixing soil and cement; and replacing and compacting the soil in two lifts.

One problem with the stabilized soil construction was encountered. Lateral shifting of the top two inches of soil occurred during compaction with a vibratory roller. Use of a rubber-tired roller would have reduced the problem. The best combination of compaction equipment and compactive effort depends upon the soil being stabilized.

Two craters were blown in the existing PCC pavement. Each had an apparent diameter of 15-20 feet, but actual repair diameters were over 25-30 feet after upheaval was removed.

One repair method used a polyurethane and fiberglass FOD cover. The FOD cover was over a base of debris and 18 inches of ballast rock choked with crushed stone. The base was compacted with a vibratory roller. The FOD cover was anchored with a recently developed low-profile bushing and modified WEJ-IT anchor bolt.

The second repair method used the two meter-square (German) precast concrete slab. The precast slab repair required the removal of all debris and a high-speed saw to cut the concrete into a modular size. The hole was filled with ballast rock and not compacted. A two to four inch leveling course of finely crushed stone (pea gravel) was placed on the ballast rock and hand-screeded to the required level. The slabs were placed in the crater, on top of the uncompacted base materials.

Rapid repair work was done by the 437th Prime BEEF team from Charleston AFB. F-4 operations were conducted on the surfaces by members of the 3246th Test Wing, Eglin AFB. The tests included severe test points of heavy braking, sharp turns, touch-downs, and after-burner takeoffs. No problems were encountered with the F-4.

Several initial observations were apparent:

- The precast concrete slabs were effective at speeds greater than 40 knots, showing little vertical motion or horizontal movement.
- The slabs require some compaction of the ballast base course. The repair, without compaction, began sagging under low-speed passes (the underlying sub-base had been disturbed by the blast and both sub-base and ballast settled).
- The polyurethane FOD cover and new anchors appeared feasible for repairs in the touch-down zone. Quality control is required in fabrication of the FOD covers.
- The thin asphalt did not rut or shove excessively, even during hot weather conditions.
- The stabilized soil did not rut, but should receive a surface treatment to prevent damage from jet blast and tire abrasion. A pug-mill to mix the soil and cement will improve construction quality.

Preliminary data collected from these tests and trafficking operations are being processed. Draft report results are scheduled to be available in April 1984.

by Norm Fowler

The Q's & A's of Air Force Grounding Systems

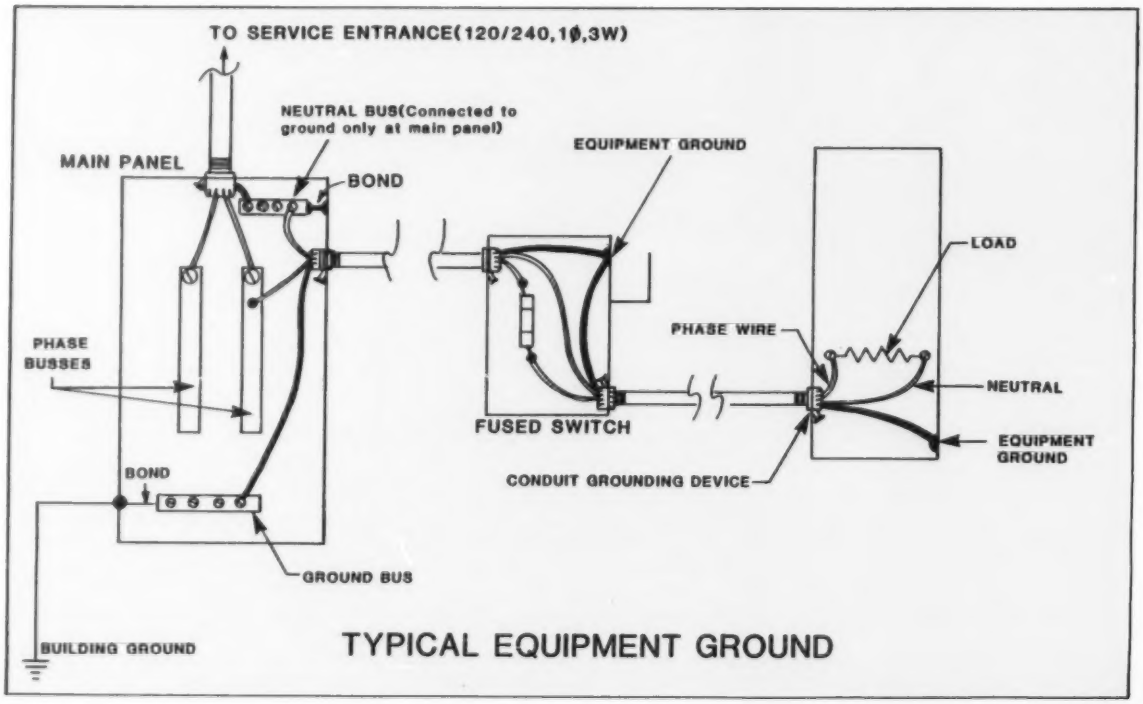
There have recently been many questions and much confusion on the testing and marking of grounds in Real Property Investment Equipment (RPIE) facilities. In AFM 88-9, Chapter 3, a static ground is defined as a connection made between a piece of equipment and earth for the purpose of draining off static electricity charges before a sparking potential is obtained.

Typically, static grounding involves connecting large metal objects, such as certain fuel tanks, to earth through a ground rod(s). National Fire Protection Association (NFPA) =77 and IEEE Standard 142, "Recommended Practice for Grounding of Industrial Power Systems," state that resistances as high as 10,000 megohms (10^{10}) will provide an adequate static electricity leakage path in many cases. When charges are generated rapidly, a resistance as low as one megohm might be required.

In contrast, NFPA =407 recommends a resistance of 10,000 ohms or less for static grounding of aircraft. Current Air Force policy specifies either a 10,000 (AFM 85-16) or 100,000 (AFM 88-9) ohm maximum resistance. Efforts are presently under way to standardize specifications and bring these two Air Force manuals together with NFPA standards.

Static grounds are not part of the electrical distribution system. An electrical system ground refers to the condition of having one wire or point of an electrical circuit connected to earth. This connection point is usually made at the electrical neutral (though not always) and is called the "system ground." The objective of electrical grounds is to stabilize voltage with respect to ground reference and to provide a low impedance path for fault currents. Examples of electrical system grounds are generator neutral points connected to the ground and the grounded neutral of an interior wiring system. The NEC requires the grounds on systems below 600 VAC to be no more than 25 ohms. Medium voltage systems (1KV-15KV) are frequently grounded through a resistor and may exceed 25 ohms. This is done to limit the magnitude of ground fault current to a manageable level.

Equipment grounding, in contrast with static or electrical system grounding, pertains to the interconnecting and connection to earth of all noncurrent-carrying metal parts of an electrical wiring system, or of equipment connected to the system. This is done so that the metal parts with which a person might come into contact



TYPICAL EQUIPMENT GROUND

are always at or near zero volts with respect to ground. Equipment grounding must also be capable of carrying the maximum ground fault current possible without causing a fire or explosive hazard to building or contents. An example is the bare copper conductor connected to the frames of electric motors, breaker panels and outlet boxes. The equipment ground frequently connects to the system ground at (and only at) the electrical service entrance of a building. Resistance values should not exceed 25 ohms.

While keeping these definitions in mind, let's look at some questions and answers most frequently asked:

QUESTION: What grounds need to be marked?

ANSWER: Per AFM 85-16, para 1-33a, all static grounds are to be marked with the date inspected.

QUESTION: How do you test POL grounds connected to underground pipe systems that have cathodic protection?

ANSWER: AFM 85-16, para 1-28e(2), states grounding should be connected only to the hydrant which must be isolated from underground piping which is cathodically protected. In general, cathodic protection does not affect the manner in which a ground is tested. Depending on the amount of protection on the ground, the ohmic reading may be slightly higher than would be the case if the ground was not cathodically prqtected.

QUESTION: What is the frequency of test and the maximum resistance for ground points in truck maintenance bays?

ANSWER: All static grounds are to be tested once every three years and must not have a resistance exceeding 10,000 ohms. Per AFR 91-4, para 9c, facilities' system grounds are to be tested every five years and should not have a resistance greater than 25 ohms.

QUESTION: What is the grounding requirement for small diesel fuel tanks?

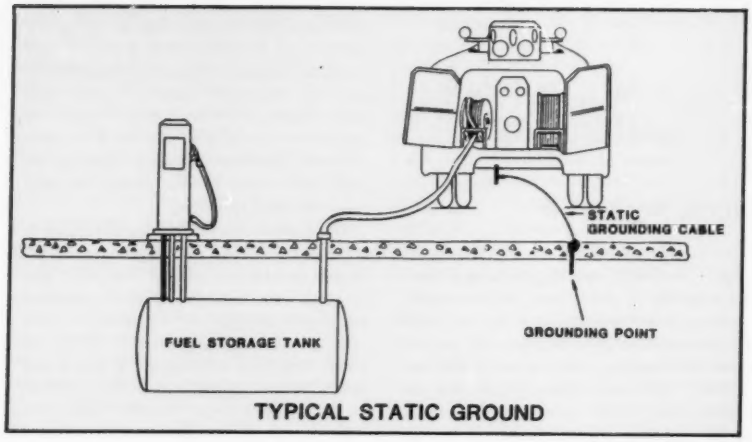
ANSWER: Per AFM 85-16, para 1-28a, tanks with direct contact with earth need not be static grounded unless their resistance is greater than 10,000 ohms. Tanks which rest on concrete pedestals are to be static grounded through a ground rod.

QUESTION: What is the frequency for testing and the maximum resistance of POL lab and fuel truck transfer check points?

ANSWER: Since these are static grounds, the maximum resistance is 10,000 ohms and are to be tested every three years.

QUESTION: Wouldn't a lower resistance than 10,000 ohms be better for static grounding?

ANSWER: Since this value is less than or equal to what the NFPA and IEEE standards state, a further reduction would mean a needless increase in maintenance requirements.



TYPICAL STATIC GROUND

QUESTION: What is the test frequency and the impedance for grounds in LOX storage areas?

ANSWER: For static grounds, three years and 10,000 ohms max.

QUESTION: How are discrepancies between the various TOs and AFMs concerning grounding resolved?

ANSWER: AFR 8-2 says the operation and maintenance of real property or real property installed equipment are excluded from the TO system. Since ground rods are real property, TOs are not binding on the installation or maintenance of them.

QUESTION: Does copper make the best ground rod?

ANSWER: Since most of the resistance of a grounding connection is in the earth immediately surrounding the ground rod, it makes little difference whether the rod is copper or galvanized steel. Since copper does not easily corrode, it is favored for long-term integrity of the grounding system. More noble metals like copper will, however, cause corrosion to less noble metals like iron and steel, and should not be connected to these metals when soil resistivity is less than 30,000 ohm-cm. Galvanized steel ground rods should then be used instead.

QUESTION: What type of ground is connected to the third prong of a standard 120V, three-prong receptacle?

ANSWER: The equipment ground is connected to the third prong of this type of outlet. The presence of two-prong outlets which do not have the grounding prong is sometimes a safety write-up. Installation of three-prong receptacles as a result of such a write-up accomplishes nothing without this equipment ground wire (the NEC does allow the use of conduit as an equipment ground).

QUESTION: Isn't the neutral wire the same as the equipment ground?

ANSWER: No. The neutral is a ***grounded*** conductor which carries current during normal system operation. The equipment ground is a ***grounding*** conductor which only carries current during abnormal conditions such as a ground fault. The NEC specifies that these two conductors be connected only at the building service entrance.

Norm Fowler is an electrical engineering consultant in the Directorate of Operations and Maintenance, HQ AFESC. He was previously with the Army at Seoul and Pusan, Korea; and with the Air Force at Kadena AB, Okinawa, and Eglin AFB, Fla. He graduated from Auburn University with a bachelor of science degree in Electrical Engineering. He is a registered professional engineer in Minnesota.

UNITREP
It's Not a Four Letter Word

by Maj. Robert Bittner

Common responses to the mention of the term "UNITREP" are the gnashing of teeth or a series of expletives. This is unfortunate. If interpreted correctly, UNITREP (a readiness reporting system) can provide beneficial results. The purpose of this article is to give some background into the development of the system and hopefully foster a better appreciation for why it is structured the way it is.

For anyone unfamiliar with the term, UNITREP stands for Unit Status and Identity Report. Overall policy for its implementation is provided by the Joint Chiefs of Staff (JCS). AFR 55-15, Unit Combat Readiness Reporting, further details UNITREP policies, procedures and criteria for the Air Force.

Under the system, combat ratings (C-ratings) are determined for select categories of military units to indicate readiness for potential contingency operations. The C-rating scale is broadly defined as:

- C-1 — fully combat ready
- C-2 — combat ready with minor deficiencies,
- C-3 — combat ready with major deficiencies, and
- C-4 — not combat ready.

Background

AFR 55-15 provides the criteria and percentile correlation tables for equating various readiness factors into appropriate C-ratings.

Air Force units must maintain a state of readiness adequate to meet wartime mission needs. While the goal for all units is to maintain a C-1 rating, Headquarters U.S. Air Force realizes that not all units are capable of attaining that level. This is because resource limitations frequently require a trade-off between near-term readiness and continuing requirements for peacetime operations and force modernization. While fluctuations in C-ratings are expected, efforts to improve any problem areas are also expected.

RED HORSE • Rapid Engineer Deployable, Heavy Operational Repair Squadron, Engineer.
Prime BEEF • Base Engineer Emergency Force.
Prime RIBS • Readiness in Base Services.

The goals of Air Force combat readiness reporting are not only to provide an accurate assessment of unit readiness, but to establish a data base of essential readiness management information. Consistent with JCS policy, AFR 55-15 requires readiness information in four broad areas: Personnel, equipment and supplies on-hand, equipment readiness, and training.

Measurement Criteria

Measurement criteria for personnel focuses on two factors — the availability of the total number of personnel required, and the availabilty of designated "critical" personnel as specified by AFSC. The "critical" AFSC terminology should not be confused with the Critical Military Skills (CMS) Program. For UNITREP, the "critical" AFSC applies to a unit's ability to meet taskings.

Measurement criteria for equipment and supplies on-hand emphasizes the availability of wartime-required supplies and equipment. This is specified in functional area guidance. Typically required items are airplanes, WRM equipment, rapid runway repair (RRR) vehicles and mobility bag assets.

Finally, the training measurement criteria evaluate the number of required personnel who have completed all training requirements for accomplishing potential wartime missions. These requirements include pilot training, weapons qualification, chemical warfare and field training. Training requirements are specified by functional area managers, or MAJCOMs.

After C-ratings are determined for each of these resource areas, the unit commander then determines an overall unit rating based upon an assessment of overall unit capability. The commander must take into consideration the objective results of the resource area ratings and other factors that contribute to overall mission effectiveness. AFR 55-15 states, "The commander's assessment is the key element in determining and reporting the unit's C-rating." With good reason, the commander may assign an overall rating that is different from the highest or lowest resource area rating.

DOC Statement

A major ingredient in determining the unit's rating, is the specification of its wartime mission. This is spelled out in the unit's Designed Operational Capability (DOC) statement. The statement outlines requirements on which unit combat readiness is based. When a unit has multiple wartime missions, the most demanding resource or time-sensitive requirements are to be specified in the DOC. For theater units, in-place generation missions are usually specified. For CONUS units, mobility missions are usually the most resource demanding. Some units will have a combination of mobility and generation missions.

UNITREP's Importance

The regulation also specifies what categories of flying and non-flying units will be C-rated. Before UNITREP was implemented in 1980, only combat units were readiness-reported to the JCS. During development of AFR 55-15 in 1979, combat support and combat service support units were given the option of reporting under the UNITREP concept. The Director of Engineering and Services (HQ USAF/LEE) believed that the Engineering and Services (E&S) community could benefit from participation under UNITREP. At that time, there was only limited recognition of the importance of E&S to

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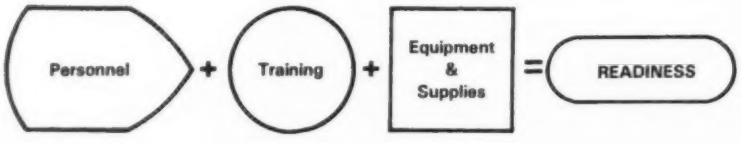


the success of combat operations and participation in UNITREP would provide greater visibility to our senior Air Force leaders of the E&S mission. Under the system, any readiness deficiencies would be highlighted for appropriate corrective action.

In 1979, Rapid Runway Repair (RRR) was deemed our most important contribution to combat effectiveness. Without the timely repair of potentially war-damaged runways, effective sortie generation is impossible. It was then important to C-rate units that could best provide timely RRR capability – in-theater CE units and CONUS units having mobile Prime BEEF teams. RED HORSE squadrons were also included in the system since they provided an essential wartime construction capability as well as a secondary RRR role. Services was not initially included under UNITREP since its mobile Prime RIBS concept had not yet been developed.

Since RRR was to be the focus of civil engineering UNITREP reporting, C-rating measurement criteria was developed with RRR operational requirements in mind. For example, since RRR operations are predominantly labor intensive, the original critical personnel measurement criteria allowed the assignment of people from any civil engineering AFSC into vacancies on Prime BEEF teams. With this "free substitution" policy, CONUS CE units were able to count missing AFSC requirements as filled.

Initial Results

During its first year of implementation, UNITREP did provide some positive results for CE readiness. While overall ratings for most units were generally good, some problems were noted in the equipment and supplies resource areas. These problems were primarily in individual mobility equipment. The visibility provided to this adverse condition led to substantial increases in MAJCOM funding. Most CE units now have ***all*** their required equipment for mobility contingencies.

System Problems

As with any newly conceived program, some problems with the system occurred. Some senior commanders began looking at UNITREP as a "report card" upon which to evaluate the performance of their people. They tended to place the blame for low ratings on unit commanders. This was an incorrect approach and led to a bad name for the system. In many instances unit commanders have little or no control over factors affecting C-ratings. If the commander is not provided with the people or financial resources to satisfy his wartime requirements, then there is little the unit can do to improve ratings.

Another problem in the original regulation was the lack of standardization between the various functional areas being rated under the system. Standardization is necessary so that when JCS or HQ USAF resource managers review rating trends, they can make comparisons from a common measurement baseline. The lack of this can mask true readiness deficiencies and undermine the process of priority setting and resource allocation. The last problem with original guidance was confusion with AFR 55-15 criteria. This led to erroneous readiness reporting.

Needed Changes

In 1981, HQ USAF initiated action to correct major system problems through a revision of the regulation. Their goal was to clarify and standardize measurement and reporting criteria. Civil engineering criteria were criticized for non-standardization in two measurement areas – critical personnel and training.

Air Force Inspector General and auditor's reports found that "free substitution" policy, in particular, distorted the magnitude of the true shortage of CE AFSC requirements. At the same time, Headquarters Air Force Engineering and Services Center (HQ AFESC) and the Air Force Management Engineering Agency (AFMEA) were initiating a theater wartime manpower requirements study. Preliminary findings were that for expedient beddown construction and facility war damage repair, all CE AFSCs were required in wartime. The free substitution policy needed to be discontinued. If the required AFSC was not available, then the position, though manned by an individual with another AFSC, would be considered vacant for UNITREP reporting purposes.

Training measurements criteria also warranted changing. Contrary to standard UNITREP criteria, original civil engineering training was geared to the effectiveness of each unit's training program. It measured the percent of ***available*** people who had completed training. This was inappropriate. JCS UNITREP policy is aimed at total requirements. Civil engineering criteria were revised to measure the percent of ***required*** people who had completed training.

Services Recognized

Since AFR 55-15 was being revised, two more significant changes were included. Considering full development of the Prime RIBS program, as well as the capabilities and importance of the services mission, a new services chapter was developed for inclusion in AFR 55-15. Also, the JCS and HQ USAF only allow unit reporting – services and civil engineers deploy by team or UTC. The capability to C-rate by UTC as a subordinate mission rating was incorporated.

The revised regulation was implemented in March 1983. For Services, UNITREP has given increased visibility to the need for additional emphasis toward Prime RIBS mobility, equipment and training. For civil engineering, the revised regulation resulted in lowered C-ratings. These lowered ratings were expected, for base-level peacetime authorizations generally don't match the AFSC requirements of the currently postured Prime BEEF teams. Applying new UNITREP personnel criteria highlighted a problem with the existing Prime BEEF team structure.

Revising Prime BEEF

The need for a revised Prime BEEF team structure was first observed during the AFESC/AFMEA wartime manpower study. It confirmed the need for civil engineers far in excess of existing active, Guard and Reserve force capability. While all existing military engineers are required for wartime operations, existing Prime BEEF team structure doesn't allow all civil engineers to be placed on teams against exact AFSC requirements. The solution – a new team structure is required to match wartime requirements and provide for a match against base-level authorizations.

Steps are now under way to restructure Prime BEEF teams. It is anticipated that the new team concept will be implemented in the coming year. As currently envisioned, all base-level civil engineers will be assignable to team positions requiring their primary AFSC. Thus, the mismatch in the critical personnel area will be greatly reduced. Only the non-availability of authorized people would degrade personnel readiness. Here again, UNITREP would be used to highlight any shortage in authorized personnel.

An additional change to the system is expected in the near future. As mentioned earlier, the only base civil engineer (BCE) requirements currently being C-rated are in-theater RRR and CONUS mobility. But there are other critical mission needs for our units. Both CONUS and theater units must be prepared for expanded wartime home-station taskings. For example, theater units must have materials and equipment available for beddown construction and war damage repair actions. CONUS BCE units must meet sustaining mission requirements for strategic offense and defense, expanded training or depot maintenance activities. Rating measurement criteria will be developed for these wartime-required, home-station capabilities.

A Better Reputation

UNITREP has gained a bad reputation because of a misapplication or misinterpretation of C-rating results. Current and future revisions of measurement procedures will be aimed toward making UNITREP a more valuable and ***UNDERSTOOD*** readiness assessment system.

Information Resources at Work in...

"Andrew's Place"

by Andrew Poulis

• "What devices or methods are available for the detection of tunnel digging?"

• "What are the effects of aircraft jet blast, aircraft braking and aircraft tail hooks on runways?"

• "Does climate affect Rapid Runway Repair?"

• "Find information on forecasting energy usage influenced by weather."

Search requests like these were some of the 300 literature searches done by the Headquarters Air Force Engineering and Services Center's Technical Library in 1982. These searches would have taken months — even years — if the department requester had tried to get the data from university libraries, and cost isn't even mentioned. Instead, the entire search process, including search strategy, data base searching and document delivery, took but a few days.

The Center is an Air Force separate operating agency that puts its information resources to work. As such, it not only offers many engineering services Air Force-wide, but a unique opportunity for the professional growth of its employees. This presents a challenge to the center's library, or TST as it is called.

The library has evolved in the last two years from primarily lending technical reports, or the "place where they store the books," to its present status as a true reference library. It has a full range of information services in physical sciences and engineering.

In 1981, the library started using a computerized approach to access engineering information. Before, if we needed engineering or other scientific information, we had to spend time identifying and gathering the literature of many separate disciplines. The information was scattered all over — if it ever existed at all.

In the '80s, high technology and engineering have grown to be major national and international issues. What was once a manageable information flow has swelled to enormous proportions. Today's technician or scientist is bombarded with information in the form of journals, reports, conference papers, proceedings, government documents and more — much more.

TST's purpose is to give quick and cost-effective access to the scattered components of these information-rich fields of engineering and physical sciences. And it does this through the following:

• A modest collection of 30,000 books and technical reports.

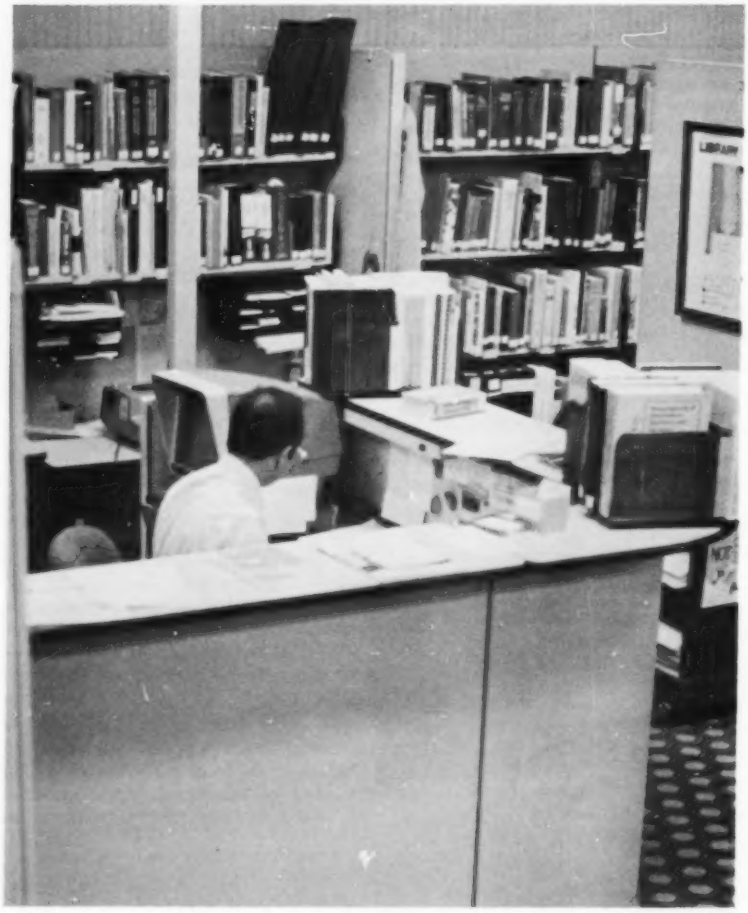
• International Handling Services (IHS/VSMF) engineering library of more than 100,000 bibliographic records of national, international military and industrial standards and specifications.

• 475 subscriptions to technical journals, newsletters, and legal binder services.

• Acquisitions of books and technical reports using on-line modes.

• Interlibrary loan service through the electronic mail which has proven very economical.

• Current Awareness Bibliographies



AFESC's technical library occupies minimum floor space but offers a tremendous variety of services. Efficient use of the front desk (above) permits customer service while performing library administrative duties. Extensive use of microfiche and both on-line and off-line computer resources (right) are keys to full technical capabilities.

(CAB) and Selective Dissemination of Information (SDI).

• Automatic Document Distribution (ADD) and Selected Resources in Microfiche (SRIM) which allows collection development in highly specialized fields.

• Data Base Searching.

On-line systems have tremendously enhanced TST's capability to access engineering information. Today there is access to on-line bibliographic retrieval systems like:

• Lockheed Dialog, with more than 170 data bases covering most disciplines of human knowledge;

• Defense Technical Information Center (DTIC) which has research development, test and evaluation on-line with more than 1.5 million technical reports (the DROLS system);

• Department of Energy's (DOE) remote console (RECON) system with more than 20 data bases covering all aspects of energy from worldwide sources;

• TECH-NET system from the International Handling Services covering all national, international, military and industrial standards and specifications;

• BRS system, from Bibliographic Retrieval Services Inc., with more than 60 data bases in the sciences, social sciences, business and general reference;

• NEXIS/LEXIS system, from Mead Data Inc., containing most of the worldwide news services, business magazines, encyclopedia and one of the most extensive legal research libraries available on-line.

Information retrieval at TST contains two levels. First is the attempt to identify sources of information about certain subjects, individuals, companies, products, specifications and standards. Data base searching is most useful at this level and the results are known instantly. The second level is more detailed, and might take longer. It involves the acquisition of information not available in the library, such as the actual document or article identified in the first-level search.

To illustrate how TST is putting its information resources to work, here is an example of a typical search. Needed was available information on fire-fighting techniques used to suppress magnesium metal fires. An air base survivability engineer wanted to know what, if any, research had been done in this area. The librarian, after initiating a search strategy of pertinent subject terms, checked the in-house resources and DTIC's DROLS system. This gave him 17 references (called hits), four that were pertinent and two that were on file. Then he ran a quick check with Dialog's index to find out what data bases would give the most information on the subject. There were eight different data bases that provided the information, ranging from eight to 160 hits.

The data bases of National Technical Information Service (NTIS), Engineering Index, Metals Index, Chemical Abstracts and Patents gave the most references. To save on-line costs, the librarian had the bibliographies printed off-line and mailed to the center. Within days the project officer had the complete bibliographies with abstracts in his hands.

Since research and planning is an important function of the officer's work, it is essential for him to keep abreast of any new technological developments in his field. Therefore, the librarian asked whether he would like to have a current awareness bibliography on his subject. Both CAB and SDI offer monthly or quarterly updates on specialized subjects tailored to the requester's needs.

The officer accepted and the librarian initiated, through DTIC's CAB program and Dialog's SDI program, that month's information on magnesium fires. After checking the bibliographies, the requester asked to have all related journal articles and documents to aid him in his research. The information was ordered the same day using the on-line ordering system (DTIC, NTIS, Government Printing Office and Dial-Order). The articles were ordered through the interlibrary loan services using electronic mail. In a few days the documents arrived.

Since this search was an on-going project for the center and TST was lacking particular materials on the subject, a collection of information on magnesium fires was started by both the librarian and the officer.

The difference between the information capabilities of today, compared with those of the past, is that a search such as this would not have been possible within the normal time frame and cost restraints.

Benefits derived from the technological advances in computerized information gathering are not only better decision-making by management, but increased productivity and professional growth. It was not long ago that technical librarians had to do manual literature searches — checking one reference after another or one index at a time. It would take hours, even days, to present a basic bibliography to the engineer. The effort spent to combine two or three different subjects was long and tedious. Now, the computer does all the searching and provides a quick print-out listing only the documents pertaining to a subject or combination of subjects. The time saved is great, and the cost of purchasing and storage is reasonable.

Indications of TST's success can be gleaned from the enthusiatic remarks of the users. "Customer" assessments prove the library's value. "How did we ever do without it? . . . TST gives me confidence to do the job right and with the most up-to-date information possible on my desk."

(Editor's Note: While the Center's limited technical library staff cannot support the extensive workload imposed by worldwide E&S random inquiries, the librarians stand ready to assist MAJCOMs and SOAs in establishing their own technical library needs, and to demonstrate ways to find technical information when it is needed in the most efficient way possible.)

Andrew D. Poulis is the chief of the technical library, HQ AFESC. He came to the center in 1980 from the U.S. Coast Guard Air Station, Cape Cod, Mass., where he was a librarian at the facilities engineering branch. He holds master's degrees from the University of Pittsburgh (Library and Information Science), and the University of New Hampshire (Education).

tecnotes

SOLID AQUEOUS FILM FORMING FOAM (AFFF) — A dehydrated version of the current three percent AFFF is under development. By September 1984, a military specification will be available, enabling users to order the new agent. It will weigh 70 percent less, occupy 75 percent less space, and have an unlimited shelf life. The initial application will be in WRM storage. (HQ AFESC/RDCS, Mr. Walker, AUTOVON 970-6283)

FIRE VEHICLE SIMULATOR — A concept study has been completed and prototype development is underway to construct a full-size fire vehicle simulator. The increased environmental restrictions on the open burning of hydrocarbon fuels and maintenance cost for our firefighting vehicles have placed significant constraints on firefighter training. These difficulties will be reduced by the use of the simulator to supplement the current limitations on live-fire training. (HQ AFESC/RDCS, Mr. Walker, AUTOVON 970-6283)

HARDENED AIRCRAFT SHELTER SYSTEM — A program is underway to develop and test a fire detection/suppression system for hardened aircraft shelters. When developed, the system will be capable of detecting and extinguishing shelter fires within 15 seconds. (HQ AFESC/RDCS, Mr. Walker, AUTOVON 970-6283)

ASPHALT-RUBBER GUIDE SPECIFICATIONS — Laboratory testing and field inspection of Stress Absorbing Membrane Interlayers (SAMIs) to reduce reflection cracking in pavements have resulted in guide specifications suitable for contracting. These are to be included in standard criteria and drawings for airfield pavements, scheduled for distribution in FY85. However, quality control procedures need to be strengthened with additional data. You may contribute by advising us when your organization plans to perform any asphalt-rubber work. (HQ AFESC/RDC, Mr. Murfee, AUTOVON, 970-6258)

MINIMUM OPERATING STRIP SELECTION PROCEDURE — An integral element of base recovery after attack is selection of a minimum operating strip (MOS) that can be rapidly repaired to support combat operations. Current procedures provide for selection based only on F-4 surface roughness criteria. An improved manual procedure is being developed incorporating C-141 and C-130 surface roughness templates. The new procedures redefine the repair quality specifications in a format suitable for multi-aircraft operations (HQ AFESC/RDCR, Mr. Strickland, AUTOVON 970-6267)

HEADSETS FOR TRACTOR OPERATORS — Headsets for tractor operators make sure that tower communications are understandable when working in the active airfield environment. A recent suggestion evaluated at HQ AFESC pointed out that both operations and safety benefit when tractor operators understand radio traffic the first time around. The sets are ancillary items to the basic radio sets authorized in Part C of TA 660. An Air Force Form 601 must be submitted to base supply's allowance and authorization unit, after validating requirements with the local board governing communications requirements. (HQ AFESC/PQPP, MSgt. Shier, AUTOVON 970-6399.)

PCB ANALYSIS BECOMES ROUTINE FIELD TASK — With the recently developed ESL method, anyone can do the five-minute, $5 test on oils or soils contaminated by PCBs. A limited number of kits are available for checkout and field evaluation. For information contact the Environics Division. (AFESC/RDVW, 1 Lt. Aldrich, AUTOVON 970-2942)

CHEMICAL SUBSTANCES INFORMATION NETWORK (CSIN) — Looking for data on hazardous chemicals? An EPA-developed clearing house computer is available for chemical substance identification and related bibliographic information retrieval. Currently managed by the President's Council on Environmental Quality, CSIN programming standardizes and automates searches of five commercial data bases. User training and computer time is provided gratis for a limited introductory period. (AFESC/RDVW, Capt. Tapio, AUTOVON 970-4628)

MATERIAL SELECTION FOR ADVANCED BDR SYSTEM — Following extensive development and testing of candidate materials for a structural cap repair system, two materials (polyurethane and furfuryl alcohol) which could potentially meet all our requirements have been identified. A critical design review was held in October 1983 to compare the total repair systems required for each material. As a result of this review, polyurethane polymer concrete, formed by percolating polyurethane into pre-placed aggregate, was selected for further development as the advanced BDR system. Equipment/material system development has been initiated. (AFESC/RDCR, Lt. Col. Wiedemeier, AUTOVON 970-6317.

SENIOR OFFICER ASSIGNMENTS

AS OF OCT. 15, 1983

GENERAL OFFICERS

Maj. Gen. Clifton D. Wright, Jr.	AF/LEE
Brig. Gen. M. Gary Alkire	AF/Deputy LEE
Brig. Gen. George E. Ellis	TAC/DE, Langley AFB VA
Brig. Gen. Joseph A. Ahearn	USAFE/DE, Ramstein AB GE

COLONELS AND O-6 SELECTEES

A

Aldinger, Richard T.	AFESC/AD
Allen, Robert L.	BCE, Hill AFB UT
Allison, Thayer W.	BCE, Eglin AFB FL
Archer, Curtis F., Jr.	BCE, Arnold AFS TN
Arnau, Robert R.	15AF/DE, March AFB CA
Austin, William F. III	BCE, Little Rock AFB AR

B

Bannwart, James L. +	TWC, Nellis AFB NV
Baushke, James L.	ESD/FA(PM), Hanscom AFB MA
Beauchemin, Alfred E. III +	AFESC/DEMG
Bell, Robert L.	823CESHR, Hurlburt Fld FL
Bendrick, Frank E.	BCE, WPAFB AFB OH
Bittle, Darrell G.	AD/YQ, Eglin AFB FL
Bohinc, Stanley A.	BCE, Andersen AFB, Guam
Boyer, Robert E.	AFESC/RD
Bozarth, Thomas L.	OASD/MRA&L, Wash DC
Branson, Claude	8AF/DE, Barksdale AFB LA
Brooks, David M.	BCE, McGuire AFB NJ
Bull, David E.	BCE, Grand Forks AFB ND
Bush, Roger G.	BCE, Keesler AFB MS
Byrd, Herman L.	AF/LEEC-2

C

Cafiso, Matthew M. * *	AFRES/DE, Robins AFB GA
Callahan, Joseph T., Jr.	AFESC/CC
Canfield, Kenneth W.	SARPMA/CC, Ft Sam Houston TX
Cannon, George E., Jr. +	SAC/CESMET, Offutt AFB NE
Cavender, Dwight B.	PACAF/DEM, Hickam AFB HI
Choate, John S. +	Air War College, Maxwell AFB AL
Clark, Walter L.	BCE, Travis AFB CA
Clark, Zack C.	BCE, Andrews AFB MD
Colclazier, Robert D. * * * *	USAFE/DEK, Ramstein AB GE
Cole, Earle R.	BCE, MacDill AFB FL
Colosimo, John C.	BCE, Ellsworth AFB SD
Compton, Phil V.	AFIT/DE, WPAFB AFB OH
Conry, James M.	AF/LEEC
Cornell, David M.	MAC/DE, Scott AFB IL
Coughlin, John J. * * *	AF/LEEVP
Cowan, Kenneth W.	AFLC/DEM, WPAFB AFB OH
Craig, William R. III * +	AFLC/DEH, WPAFB AFB OH
Crowley, Francis B., III	AFSC/DEE, Andrews AFB MD
Currin, David D.	BCE, Loring AFB ME

D

Davidson, Carl L.	BCE, Osan AB KR
DeCarlo, Anthony J.	SAC/CSG, Offutt AFB NE
DeMartino, Francis A.	AF/LEEP
Devaney, James E.	BCE, Ramstein AB GE
Duffie, Boyd T., III	BCE, Robins AFB GA

E

Evans, Charles W. +	AFESC/PQ

F

Fischer, Joseph W. *	AAFES, Munich GE
Forby, Willis E. *	MAC/DEH, Scott AFB IL
Fukumoto, Malcolm	BCE, March AFB CA

G

Gates, James L.	AFISC/IGAE, Norton AFB CA
Gersh, Frederick S.	BCE, Bolling AFB, DC
Gilbert, Robert G.	USAFE/DEM, Ramstein AB GE
Ginnetti, Mario B.	AF/LEET/CESMET
Glaze, Harry W.	554CESHR, Osan AB KR
Gogal, Robert M.	TAC/DE-2, Langley AFB VA
Goode, Thomas N. *	SAC/DEH, Offutt AFB NE
Goodwin, Roy M.	PACAF/DE, Hickam AFB HI
Gracey, Robert H., Jr.	AU/DE & BCE, Maxwell AFB AL

H

Halac, Harry E.	SAC/DE, Offutt AFB NE
Harty, John R.	MAC/DE-2, Scott AFB IL
Hearn, Max L.	BCE, Norton AFB CA
Heinz, Donald A.	BCE, Chanute AFB IL
Hicks, Joe L.	AF/LEER
High, John T., III	BCE, Clark AB RP
Hobbs, Terrance E.	AFSC/DE, Andrews AFB MD
Hodge, Ralph L.	AAC/DE, Elmendorf AFB AK
Holzknecht, William J.	314AD/DE, Osan AB KR
Honaker, Harry R.	BCE, Vandenberg AFB CA
Hooper, Bradley H.	BCE, F E Warren AFB WY
Hubbard, James	9AF/LGD, Shaw AFB SC
Husbands, Herman H.	USAFE/DER, Ramstein AB GE

I

Immel, Allen E.	SPACECOM/DEC, Peterson AFB CO

J

Johnson, Bruce W.	SAC/DEE, Offutt AFB NE
Judd, Thyane H.	CENTCOM, MacDill AFB FL

K

Kent, Richard B.	BCE, Charleston AFB SC
Kennington, Roy G. *	TAC/DEH, Langley AFB VA
Kimberly, Floyd V.	ASD/DE, WPAFB AFB OH
Kishiyama, Arthur Y.	AF/LEEPP
Klingensmith, Robert L.	AF/LEEV
Klumas, Lawrence J.	SAC/DE-1, Offutt AFB NE
Knipfer, Ronald E.	BCE, Fairchild AFB WA
Knutson, Duane E.	SPACECOM/DE, Peterson AFB CO
Kochele, Edward A.	BCE, Plattsburg AFB NY

L

Leach, Ronald S. *	AFCOMS-Europe/CC, Ramstein AB GE
Lewis, Richard B.	BCE, Carswell AFB NM
Lewis, Thayer J. * * *	AFSC/DEMV, Andrews AFB MD
Lollis, Thomas E.	PACAF/DEE, Hickam AFB HI
Lopresti, Peter	Air War College, Maxwell AFB AL
Lupia, Eugene A.	USAFE/DEP, Ramstein AB GE

M

Mackie, William A., Jr.	ROK-US CFC, Seoul KR
Maloney, John J. * +	USAFE/DEH, Ramstein AB GE
Manekofsky, Harvey +	BCE, Laughlin AFB TX
Mayhew, Jason F. +	BCE, Pope AFB NC
McCarthy, James E.	AF/LEEE
McGovern, Larry E.	BCE, Rhein-Main AB GE
Meche, Norwood J. *	ATC/DEH, Randolph AFB TX
Mitchell, Jarrell S.	AFCC/DE, Scott AFB IL
Moore, Edward S., II	BCE, Nellis AFB NV
Moore, John L.	MAC/DEM, Scott AFB IL
Morton, John E., Jr.	BCE, Davis Monthan AFB AZ
Munsie, Lawrence, Jr.	AFRCE/CR, Dallas TX
Murphy, George T. * +	TAC/DEH-2, Langley AFB VA

N

Nay, Marshall W. Jr. +	BCE, RAF Lakenheath UK
Nethercot, Hubert S.	SPACECOM/DEE, Peterson AFB CO
Nottingham, Wesley D.	BCE, Scott AFB IL

O

O'Such, Robert J. * +	Air War College, Maxwell AFB AL

P

Parker, Evans T. +	BCE, Reese AFB TX
Paul, Herbert D.	ATC/DE, Randolph AFB TX
Pearman, John D.	SD/DE, Los Angeles AFS CA
Pellek, John +	SARPMA/CV, Ft Sam Houston TX
Penn, James P. * *	AFRES/DEH, Robins AFB GA
Pezzullo, Richard E. * *	NGB/DE, Wash DC
Pomeroy, Charles W.	TAC/DED, Langley AFB VA
Price, John C.	AFRCE/WR, San Francisco CA
Prince, Neil E.	AFSC/DEM, Andrews AFB MD
Pullium, Jerry C.	BCE, Hickam AFB HI

R

Rader, Richard F.	BCE, Altus AFB OK
Reining, Robert R., Jr.	BCE, Tyndall AFB FL
Rever, Louis G.	BCE, Lowry AFB CO
Riddle, George M.	AFRCE-BMS, Norton AFB CA
Rivera, Danny	BCE, Tinker AFB OK
Robb, William G.	AFLC/DE-2, WPAFB AFB OH
Rochez, Fred	SD/DEC, Los Angeles AFS CA
Rodgers, Raymond E., Jr.	BCE, Minot AFB ND
Rogers, Charles E.	819CESHR, RAF Wethersfield UK
Romero, George A.	ATC/DE-2, Randolph AFB TX
Rosa, James W. *	PACAF/DEH, Hickam AFB HI

S

Sailer, Allen J.	BCE, Offutt AFB NE
Sams, James H., III * *	LEEP-SA
Scambilis, Nicholas A.	BCE, Kadena AB JA
Scheideman, Elton D.	USAFE/DE-2, Ramstein AB GE
Schwartz, Ray D.	SAC/DE-2, Offutt AFB NE
Scrafford, Richard E.	BCE, Dover AFB DE
Shirley, Henry G.	AFESC/DEO
Sims, William R.	AFSC/DE-2, Andrews AFB MD
Smith, Edward M. +	BCE, Cheyenne Mtn AFB CO
Smith, Jerry A.	AFESC/CV
Snow, William M., Jr.	BCE, Barksdale AFB LA
Sowers, John C.	MAC/DEP, Scott AFB IL
Stallworth, Willett R.	BCE, Langley AFB VA
Staton, William D.	BCE, Shaw AFB SC
Storm, John H.	AFWL/NTE, Kirtland AFB NM
Stowell, Dibrell C.	USAFA/DE, USAF Academy CO
Sundin, Theodore A. * *	AFESC/RE
Swint, David O.	USAFA/DFCE, USAF Academy CO

T

Tate, George R.	AFESC/DEM
Tatum, Walter F., Jr.	PACAF/DEP, Hickam AFB HI
Taylor, George R.	BCE, Edwards AFB CA
Tessier, Richard J. * +	AFCOMS/XP, Kelly AFB TX
Thornal, Leroy	LMDC/ES, Maxwell AFB AL

W

Wade, James R.	5AF/DE, Yokota AB JA
Walters, Roger W.	Riyadh, Saudi Arabia
Watkins, Church, Jr.	ESC/DE, Kelly AFB TX
Weeden, Ronald J.	ESD/DE, Hanscom AFB MA
Whitman, Walter T., III	SAC/DEPM, Offutt AFB NE
Whitmire, Jack N.	ATC/DEP, Randolph AFB TX
Whittenberg, Jean R.	USAFE/DEX, Ramstein AB GE
Willett, James G.	SAC/DEM, Offutt AFB NE
Williams, David O. +	BCE, McChord AFB WA
Wyatt, Ralph E. +	TAC/DEP, Langley AFB VA

Y

Yamada, Hisao	PACAF/DE-2, Hickam AFB HI
Yancey, Kenneth	BCE, Beale AFB CA
York, Guy P.	PM/ASTF, Arnold AFS TN

* = Services
** = Reserve or Guard
*** = Bioenvironmental Engineer
**** = Disaster Preparedness
\+ = Colonel Selectee

CIVIL ENGINEERING MISSION

PROVIDE THE NECESSARY ASSETS AND SKILLED PERSONNEL TO PREPARE AND SUSTAIN GLOBAL INSTALLATIONS AS STATIONARY PLATFORMS FOR THE PROJECTION OF AEROSPACE POWER IN PEACE AND WAR.

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